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PROFESSOR GALLY'S AUTOPHONE—DESCRIPTION, PAGE 148.

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CONTENTS, July 1, 1879.

Prof. Gally's Autophone.....145, 148
Editorial Announcements.....146
Rapid Transit in a New Phase.....146
American Commerce and Manufactures.....146
Nerve Stretching.....146
Drying Processes and Patents Relating Thereto; No. 2, Mechanical Drying.....146
Proposed New English Patent Law.....147
Singular Cause of Death.....147
Perpetual Motion.....147
Facts Pertaining to the Manufacture and Uses of Wire Rope and Teledynamic Transmision, IV.....147
The National Steam-Pump.....149
Donaldson's Milk Receiver.....149
Bessemer Steel.....150
The Inflexible Self-Setting Cat Exterminator.....150
Rolling Mill of the Future.....151
Restoring the Apparently Drowned.....151
Refrigerating a 1,500 Ton Iron Ship.....151
American Sumac.....151
Book Notices.....152
Shop and House Hints.....151, 152
List of Patents.....141

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THE chief reasons why our patent business has grown up to such importance are that, united to a long experience in the business, we devote very careful attention to the study and preparation of our cases. In addition to this care and study, we do not abandon the interest of our clients after their applications are filed in the Patent Office. We have the advantage of the best service at Washington to look after all the requirements of the Commissioner.

Rapid Transit in a New Phase.

In the month of April, acting in pursuance of law, Mayor Cooper appointed a Commission, consisting of Henry G. Stebbins, Henry F. Spaulding, Benjamin G. Arnold, Lewis G. Morris and Samuel R. Filley, to designate, lay out and extend rapid transit railways in the recently annexed district —which lies above Harlem River. With two exceptions, the Commissioners all reside in the upper district, and it was understood that the scheme to be proposed was intended to secure the extension of the new system through that portion of the city. Imagine, therefore, the surprise of our citizens when they saw in the report of the Commissioners appointed, that without any public notice of such intention, they had actually designated another elevated road, to run through the very heart of the city, commencing at a point on the northerly side of Forty-second Street, below the grade of said street; thence under, through and across Forty Second Street; and thence southerly under, through and along the easterly side of Fourth Avenue, or Park Avenue, and below the surface of said avenue to the south side of Thirty-fourth Street, ascending to the surface of Fourth Avenue; then by an elevated road over, through and along Fourth Avenue, southerly to a point between Eighth Street and Ninth Street; thence through the block on the west side of Fourth Avenue, across Eighth Street and Astor Place, through Lafayette Place; through the block to Bond Street, to Crosby Street, and along Crosby Street to Grand Street; thence through the block diagonally to a point in Elm Street, near Howard Street; thence across Howard Street, along Elm to Pearl Street; thence diagonally across the block to Duane Street; thence along Duane Street to Centre Street; thence along Centre Street and Park Row to a line drawn easterly and westerly across the city at the south line of the City Hall. When the announcement was published of this proposed route great was the consternation in the camp of the Manhattan Railway Company. The stock of this gigantic corporation tumbled 15 per cent. in one day, and each individual hair, of each individual director, who had any hair, "stood on end, like the quills of the fretful porcupine." Indeed there was reason for this agitation, for, should this proposed new road be established, it would, owing to its central location, become a very active and formidable competitor.

It seems from newspaper accounts that the proposed route was petitioned for by Edwards Pierrepont, ex-Attorney-General, ex-Minister to England, and the special and particular friend of Col. Stebbins; Augustus Schell, a prominent director in the Vanderbilt railways, and Hugh J. Jewett, President of the New York, Lake Erie and Western Railway, and of which Col. Stebbins is also an active director. In this juxtaposition of names and influences, we are furnished with a key to the position—and while we do not object to it on that account, we still entertain the belief that the Commissioners did more towards extending rapid transit than they were asked or expected to do, and Mayor Cooper seems to have been somewhat taken aback at the rapid transit strides taken by his chosen Commissioners. The report now awaits the approval of the Mayor and Aldermen—and the public, whose dearest rights are not always regarded by soulless corporations and avaricious officials, will soon be entertained with what promises to be a very lively scrimmage.

Now we do not object to rapid transit. We are in favor of it. Neither do we oppose this projected central road—it will prove a very great comfort and convenience to thousands who travel to and from the Grand Central Depot. What we do object to, however, is, that any such franchises should be given away to special favorites, to the detriment of the interests of the city and of property-holders on the route, who are called to suffer the grossest form of injury and injustice.

It has been known for some time that a very large devil, and several small ones have been active in our municipal affairs.

American Commerce and Manufactures.

In a recent issue we published a number of letters from manufacturers in different parts of the country, as confirmatory of the opinion that the tide of national prosperity is again rising. A careful scrutiny of the last report of the Chamber of Commerce of the State of New York furnishes additional confirmation.

In 1873 the country had reached an apparent culmination of prosperity, the hollowness of which was made only too conspicuous in the commercial disasters which almost immediately ensued.

Last year there was an apparent culmination of our financial troubles, yet we were in reality better off than in 1873.

It will be interesting to compare some statistics of the two periods:

Our total imports in the year 1873 reached $398,568,836. For the year ending December 31st, 1878, our imports were $303,186,867. The difference is $95,378,969. Our importations for 1873 were the largest on record, except for 1872. Those for 1878 were the smallest on record since 1868. In 1872 our importations amounted to $432,106,686, making a difference as compared with 1878 of $128,919,819.

Our exports in 1873 amounted to $348,905,066; while in 1878 they reached $362,522,688, a difference of $13,617,022. For 1872 our exports were $308,818,335.

We were therefore, in 1872 and 1873, in the position of a man with heavy indebtedness, yet who buys more than he sells. We are now with a largely reduced debt, selling more than we buy. In the condition of affairs which existed in 1873 commercial embarrassment was inevitable. In the present improved condition of affairs prosperity seems equally certain.

The labor troubles, a cloud which recently threatened to obscure this prospect, seem to have been settled for the present. The Western iron mills are again in blast, and now we can perceive nothing likely soon to obstruct commerce or manufactures.

Nerve Stretching.

THE above is the name given to one of the latest novelties in modern surgery. The relief it seems to promise from some of the most acute suffering to which mankind is liable, and the hope of positive cure from some of the most obstinate and terrible diseases of the nervous system, entitles it to the earnest attention not only of the medical profession, but of the public at large.

We gather the facts embodied in this article from a pamphlet written by William Tod Helmuth, M.D., chief surgeon of the Hahnemann Hospital, of this city. The diseases referred to and the nature of the treatment are indicated in the following extract:

"The slighter deviations of the nervous system from the normal standard, such as hysteria, chorea and spinal anæmia, are always more or less difficult to manage; but when the graver manifestations, as exhibited in epilepsy, trismus, sciatica and paresis, are present, the medical art is well nigh powerless."

"Within the past few years surgery has developed a method for the relief and cure of many of these affections in that operation known as 'nerve stretching.' The exact sphere of this novel procedure, as yet, cannot be determined; but from the ends thus far obtained it appears to offer immense inducements for further trial. The results have so surprised me that I can scarcely foretell to what extent nerve stretching may be carried."

"If indeed, sciatica may be placed under control, if traumatic tetanus can be cured in its last stages, if reflex epileptiform seizures can be prevented and paresis and spasm entirely ameliorated, what an inestimable boon nerve stretching must become to suffering humanity!"

The pamphlet contains an account of remarkable cures effected by the treatment, which, as its name implies, consists in laying bare the affected nerve and stretching it, not always gently but often severely.

"The operation may be divided into three stages: 1. Laying bare the nerve within its sheath. 2. Drawing forward and stretching the nerve. 3. Reposition and application of dressings. The first act of the operation is a most important one. In a case of traumatic tetanus some important changes were found, not only in the nerve itself, but also in the surroundings of its sheath. In all such cases *it is recommended directly to free* the nerve sheath on all sides as far as one can reach; stretching them accomplishes the rest. The second act of the operation may be performed either manually or instrumentally. In the drawing forward of the nerve one naturally uses a blunt hook or elevator, or for a small nerve an ordinary aneurism needle. The actual stretching is best accomplished by passing the forefinger, appropriately curved, beneath the nerve, and using it in conjunction with the thumb. By this means we secure as much force as is necessary, provided we place the limb in a suitable position. When a hook is used for the stretching, there would be a danger of locally injuring the nerve itself, which is not possible when the finger is used. In the case of small nerves it would be impossible to pass the finger beneath them, and hence a thin elastic band may be substituted. In this way an *elastic* traction can be exercised without the risk of bruising or otherwise injuring the nerve itself. The last part of the operation consists of the dressing. If the stretched nerve does not recede when the limb is placed back in its normal position, or if the part operated upon is one (the face) in which these movements would be impossible, the operator must gently tuck in the nerve into its bed. A small bit of drainage tube is to be placed at the bottom of the wound, which may then be appropriately closed by a few sutures. Lister's dressing and spray ought to be used in these cases, as rapid union and a small scar must be tried for."

The sciatic nerve, the inferior dental nerve, the brachial plexus, the ulnar nerve, the tibial and peroneal nerves, the median nerve in the stump of a forearm and other nerves have been stretched for the cure of various forms of painful nervous disease, as well as for paralytic affections, traumatic tetanus or lock-jaw, and reflex epilepsy. The torturing complaints, neuralgia and sciatica, appear to be especially submissive to this treatment, which, if it fulfills its present promises, will be an incalculable boon to humanity.

Drying Processes, and Patents Relating Thereto.—No. 2: Mechanical Drying.

HAVING briefly set forth the principal properties of water which must be considered in the discussion of drying processes, we shall proceed to consider drying processes which depend solely upon mechanical action.

These may be classified into simple filtering or straining, drying performed by squeezing or pressure, drying performed by centrifugal filtering, and drying by capillary attraction.

Drying by filtering or straining can be performed in all cases wherein the force of gravity acting upon the liquid to be removed is greater than the adhesive attraction of the liquid for the porous, granular or fibrous substance to be dried, or wherein the force of gravity, assisted by some other force, is sufficient to overcome such adhesion.

In general, however, the latter force is so strong

that some of the liquid will remain after the straining or filtering, which remnant, if the substance to be dried is required to be perfectly desiccated, must be removed by other means, as evaporation by heat, absorption, air contact, etc.

The number of patents on filters is very large, and it annually increases. The purpose of most of them is to utilize the liquid filtered, not to dry the substance remaining in the filter. For the latter purpose, besides the well-known and common methods of filtering by gravity only, the methods of filtering by the pressure of a follower in a box or hoop, by pressure upon bags or folded cloths containing the substance to be dried, etc., have been used from time immemorial. An important improvement has, however, been recently introduced, which consists in utilizing the pressure of the atmosphere upon the upper surface of the liquid by making an air-tight connection between the filtering funnel or vessel, and the vessel which receives the liquid filtered or drained off, and producing a partial vacuum in the receiving vessel by means of a siphon or air pump. This method, we believe, was first introduced by Bunsen, and it is now quite generally used, on a small scale, to hasten filtration where the latter, effected by the action of gravity alone, proceeds more slowly than is desirable.

So far as the patents for various forms of simple filters relate to the subject of drying, they are few and unimportant. We shall therefore pass this part of the subject without further remark, and glance briefly at drying performed by squeezing or pressure.

Appliances for this purpose consist in various kinds of presses, squeezers and wringers (improperly so called), which last effect pressure upon successive parts of fabrics or substances passed through rollers, elastic or otherwise, of which the familiar clothes-wringers are the best examples. Few more meritorious inventions than the modern clothes-wringer adorn the records of the Patent Office. The great merit of simplicity is so prominent a feature in its construction that the mechanical beauty of its operation is not generally appreciated. By its action very small power is made to perform what, by the old method of squeezing in bulk, a very large expenditure of power could not so effectually accomplish. It has saved a great deal of money to manufacturers, and a vast deal of very exacting labor in most modern households. Next to the sewing machine, it is, perhaps, the most useful machine yet introduced into domestic service.

But we must hasten to processes of drying which involve more abstruse scientific principles, and shall pass rapidly over the other systems of mechanical drying included in our classification.

The well known centrifugal machine used by sugar refiners, with various modifications relating to bottom valves, self-balancing devices and other details of mechanical construction, has been a very great addition to pre-existing appliances for mechanical drying. When run at a high velocity it imparts a tangential force to the liquid contained in it, which, although in some measure resisted by gravity, yet gives a much greater motion than unaided gravity could impart to the same liquid by acting upon it during such distances as are practicable in ordinary draining. The adhesive force and mechanical resistance of the material to be dried is the same in this kind of drying as in ordinary draining, although the liquid passes out laterally instead of at the bottom of the containing enclosure.

Many patents have been taken out for this class of machines; but in all essential respects, so far as general principles are involved, it remains the same as when first invented. The centrifugal filter was patented in the United States by Hurd, in 1844.

The last kind of mechanical action through which drying may be effected is absorption by capillary attraction. It is little used in the arts, except by chemists for small quantities of precipitates. Bibulous paper is generally used for this purpose, commonly ordinary blotting paper. The wet precipitate is placed on the paper, which is generally of ample size to attract and absorb quickly most of the water or other liquid it is desired to remove; and by changing the precipitate from one paper to another, a considerable degree of drying can be very quickly effected. This method has the merit also of not injuring substances which would be changed, by pressure or heat, in any quality desirable to preserve.

The Proposed New English Patent Law.

The following is a summary of the new Patent Bill recently introduced into the English Parliament. So far as we can see at present this bill is in the interest of progress. Contrasted with the iniquitous bill sought to be pushed through Congress last winter, it reflects great discredit upon the latter and its promoters.

The English bill embodies in substance the following provisions:

1st. The duration of provisional protection is to be extended from six months to one year, and the stamp duties thereon lowered to half their present amount.

2d. A complete specification must, however, be filed before the expiration of nine months from date of original application, or the protection will terminate at the end of the twelfth month, and cannot afterwards be renewed.

3d. The complete specification shall be immediately published, with all other documents relating to the case, and for a prescribed period any one shall be at liberty to oppose the grant of a patent.

4th. If there be no opposition, the applicant may give notice to proceed, and secure his patent, for half the stamp duties now levied.

5th. A patent shall last for twenty one years instead of fourteen, but shall become void if the £50 and £100 stamps be not duly paid at the end of the third and seventh years respectively, and an additional stamp of £100 before the end of the twelfth year.

6th. Patents can be amended or added to hereafter, but with such fees and limitations as to make an amendment—especially if an addition—almost as costly as an original patent. The amendment, however, then becoming part of the original patent, is not subject to additional stamp duties (this, however, is still a great improvement over existing practice, and all alterations mentioned so far are in favor of the patentee).

7th. The Crown shall have power to use any patented invention, paying the inventor such royalty as the Treasury shall consider fair.

8th. If an inventor do not work his invention in the country within three years of grant, and if he refuses to grant licenses on such terms as the Lord Chancellor shall consider reasonable, the patent will be annulled.

9th. Inventions first patented (or imported from) abroad can in future be patented in England by the foreign patentee (for the term of that first inventor) within six months of the date of the foreign patent, *or of the date of this Act*. But such patents will fall with the expiration of any foreign patent for the same invention, whether granted before or after date of such patent.

10th. The Lord Chancellor shall have power, in certain cases, to allow a patentee who has accidentally omitted to pay his tax in time, to pay it within three months after it became due, and thereby save his patent.

11th. All patents applied for before the passing of the Act to be independent of all its provisions, except Article 10.

12th. The modes of procedure are altered in many respects interesting only to patent agents and lawyers.

A Singular Cause of Death.

THE last number of *Johnston's Dental Miscellany* gives an account of a death resulting from swallowing a set of teeth, which was accompanied by some remarkable phenomena. The victim of the accident was a man thirty-eight years of age. The teeth were three in number. They were fastened to a silver plate, and had been in his mouth for many years. Recently the hooks holding them in place had worn loose, and the artificial teeth had annoyed him by falling from his mouth several times. Plate and all had gone down his throat, and he could feel them lodged. The patient suffered severely for five days, the teeth having remained in the upper part of the œsophagus. He was then advised to swallow some gin as the readiest means of dislodging the teeth. This resulted in vomiting, the teeth coming up and a half above the entrance to the stomach, where they remained till death occurred, seven weeks later. "Had the teeth entered the stomach, the chief danger, according to medical authority, would have been removed. But lodging as they did, the patient could swallow nothing, not even milk or water. It was absolutely impossible to get anything down his throat. Milk was recommended, but when it would be poured down, as soon as the glass would be removed from his lips, it would come back, exuding from ears, eyes, mouth and nostrils. The strangest of all was what followed. The man lived for seven weeks without swallowing a morsel of food or a drop of water. Even the juice of an orange he could not swallow. From a stout, hearty man, weighing probably 190 pounds, he dwindled away to a mere skeleton. His hands became horrible to look at by reason of their loss of flesh. Strangely enough, too, all this time, the man, who was perfectly conscious and rational, had no appetite, no craving for food." The smell of victuals, he said, made him sick. An operation for the removal of the teeth was proposed, but as no assurance of recovery could be made the proposal was rejected. The patient retained his senses to the last, and requested a post-mortem examination, which discovered the plate lodged transversely, with its hooks firmly embedded.

Perpetual Motion.

If perpetual motion be defined as that of a body which, after having received an impulse, continues to move indefinitely in virtue of its inertia alone, it is, Mr. Pinteen considers, realizable. He introduces a foreign force of constant nature to destroy resistance, instead of (as in the case of a pendulum) restoring motion which resistance has withdrawn. Thus, conceive a horizontal disk movable round a vertical axis fixed to the centre of its under surface. A small hemispherical cavity is made on the upper face. A motor force of rapid rotation is got from a reservoir below the lowest water of a river, giving a uniform intense flow by a lower orifice. Before letting the water act on the disk, a top, previously set in very quick rotation, is deposited with its point in the middle of the hemispherical cavity; then the top is covered with a glass bell jar, which is fixed with its axis coinciding with that of the apparatus. The disk with the bell jar is then set rotating by means of the water in the same direction as the top. After a certain time (it may be supposed) the movements of disk, top, and enclosed air will be equalized; then the top will no longer experience resistance at its point, for the support turns as quickly as it and in the same direction; nor will it, from surrounding air, for this also has the same angular velocity. Thus we should have the curious spectacle of a top remaining indefinitely in equilibrium on its point, presenting a case of perpetual motion in the sense defined. Of course the water would have to be let off after action on the apparatus, also the surplus water of the reservoir.

However, this kind of perpetual motion is a very different affair from the self-moving machines of visionaries. It is not a creator but a preserver of motion.

Facts Pertaining to the Manufacture and Uses of Wire and Wire Rope, and Telodynamic Transmission.

No. IV.

"There is no system of transmitting power comparable to that of wire rope in first cost. A comparison between rubber and leather belting and their equivalent in wire rope, would show the proportion of cost to be about as 1 to 5."

"In regarding the utility of this system of power transmission, it may be said to open a new chapter in productive possibilities."

"There is scarcely a manufacturing establishment of any magnitude where it is not desirable to transfer power to a separate building more or less remote, which the expense of a steam engine, with its special engineer in constant attendance, will not allow. Here is the solution of this difficulty, a method always ready, cheap and reliable."

"How many valuable water-powers are running to waste throughout this country merely because the cost of flumes or canals to available sites for factories will not warrant their erection, which this system may utilize. For, be it far or near, o'er hill or vale, meadow or stream, topography or distance can scarcely offer an obstacle that is not readily overcome."

"The power thus transmitted can be distributed to any number of factories as well as to one, and may be conveyed across large streams, if they but allow the erection of piers, or natural objects offer points to locate intermediate stations. The motor may be on one side of a stream with the factory on the other, at any point above or below it."

"A great saving may be effected in erecting factories by the substituting of wire rope for the long and heavy counter-shafting there used, and many special operations, as shearing, punching or rolling, may be performed with greater convenience in yards or outside depositories; whereas, now the material has to be carried into the mill to the shears or rolls, and then carried out again."

"In cities where property is valuable it is not always possible to secure a site which is adjacent to your factory, while that across the street may be."

"Here power may be supplied to both without the heavy expense of underground shafting or separate engines."

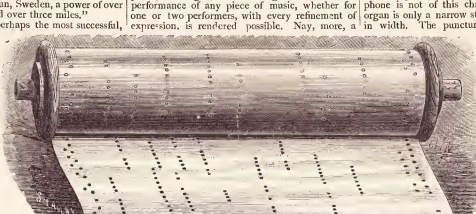
"To begin to enumerate all the instances where it may be used with the greatest economy is a hopeless task, "for their number is legion." Suffice it to say that in the utilization of natural powers the motor and factory need have no local relation to each other, their connection by this system being so simple and inexpensive, within reasonable

limits, as scarcely to form an item for consideration."

"One of the best examples of its peculiar utility is the one at Okhta, Russia. The immense government powder works located there were totally destroyed at a single explosion. They were replaced in 1864 by thirty-four distinct buildings at a safe distance apart, to which the power of three turbines, amounting to 274 H. P., is conveyed by wire rope, and thus distributed to each, making a line over a mile long."

"At the mines of Falun, Sweden, a power of over 100 H. P. is transmitted over three miles."

"The largest, and perhaps the most successful, wire rope transmission is the one at "Schaffhausen, at the Falls of the Rhine." Here the power of a number of turbines, amounting to over 600 H. P., is conveyed across the stream, and then a mile away to a town where it is distributed and utilized, a system that could be repeated with profit in hundreds of localities in our own country."



PROFESSOR GALLY'S AUTOPHONE.—FIG. 2.

Other important uses for wire rope we must pass without discussion, as we have already extended this series of articles beyond the limits originally intended. It will hardly be necessary to speak of the enormous extension of the demand for the construction of suspension bridges. In large structures, however, as in "The Great East River Bridge," the main cables are generally constructed of parallel straight wires, and "*twisted cables*" are used only for the suspenders and stays.

In smaller structures the main cables frequently consist of single wire ropes, or several bound together.

Short tramways for unloading vessels, conveying ores in mines, handling coal, etc., are annually coming into more extended use, and the demand for wire rope for these and similar purposes correspondingly increases.

In towing boats in canals there seems a great future for wire rope. We announced, in an article published in our last issue, the completion of a contract by Mr. Haigh for the supply of 300 miles of crucible steel wire rope to the New York Steam Cable Towing Company, for use on the Erie Canal in the Belgian system of steam towing.

Besides the manufacture of wire rope and wire, the works of Mr. J. Lloyd Haigh produce annually large quantities of wire springs for upholstering and other purposes. Another department of this extensive and prosperous establishment is devoted to the manufacture of umbrella frames, in which department some interesting operations are conducted, and some ingenious machines are employed.

The establishment is well organized, and gives constant employment to a large number of hands. It is in all respects one of the most important located in or near the city.

The Autophone—A Most Ingenious Invention.

We illustrate herewith one of the most ingenious pieces of mechanism which has recently been produced. It is the invention of Professor Merritt Gally, of this city, already widely known as the inventor and manufacturer of the Universal printing press. By the application of this mechanism to any kind of keyed instrument, such as the piano, reed organ, or church organ, the automatic performance of any piece of music, whether for one or two performers, with every refinement of expression, is rendered possible. Nay, more, a flutist or violinist may, while performing a solo, produce his own accompaniment with the certainty of perfect accuracy as well as absolute subordination to his solo part, a very difficult thing to secure with the average accompanist. The autophone is not in itself a musical machine. In fact, it is more of a philosophical than a mechanical apparatus. It is applied, however, in the mechanical construction of musical instruments, and, as intimated above, it enables a person without any knowledge of music to render, on any kind of a keyed instrument, any piece of even the most difficult nature with all the expression of an artist. This he can do quite as easily as to operate an ordinary hand-organ, music-box, or musical cabinet, to produce what may strictly be called *machine* music. The aim of Prof. Gally in producing his invention has been to divest automatic music of its mechanical qualities, and still enable any one to produce music of a much higher quality without the necessity of long-continued practice.

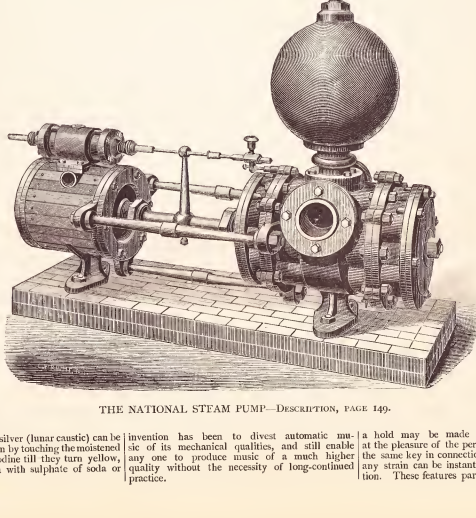
Fig. 1 represents a cabinet organ in which the autophone is constructed.

Fig. 2 represents a small roll of thin paper punctured with very small holes, by means of which the autophone is operated.

Wide, cumbersome music-sheets, having slots representing the notes of music, through which a sufficient quantity of air is forced to operate a set of reeds, is quite common in musical machines, but the music thus produced is of necessity of an inferior quality. The music-sheet for the autophone is not of this character, and for a large organ is only a narrow strip less than four inches in width. The punctures visible in the figure represent a great many notes and expression movements, and still the air passing through them all would not be sufficient to sound a single note on a large organ pipe. The autophone operates pneumatically, but the small punctures in the music-sheet supply air only to trip very sensitive devices, which operate like the human fingers for producing the notes and opening and closing the stops, swells, etc. The perforations in the centre of the strip represent the notes of the music, and those near the edges the expression to be produced by the stops and expression devices of the organ, which respond to the action of the autophone with the same ease and rapidity as the note keys. Everything that can be indicated in the writing of music can be represented in this sheet, and will be perfectly followed by the action of the instrument, so that even the personal expression of any musician can be perfectly reproduced.

The autophone is, however, not limited to the expression indicated in the sheet. On each side of the receptacle in which the lady at the organ is placing the roll of sheet-music, four small keys will be seen, connected with button stops. These small keys control the stops and expression devices of the organ, and with a simple touch any stop may be thrown in or out of action at pleasure.

These few keys can be learned in a few hours, so that a person can have full control of the music, although he would not be able to produce the simplest melody on the keyboard of the instrument. The expression keys are marked with the names corresponding with the stops which they represent, so that no mistake can be made. Music is not a mere accumulation of notes, but consists almost wholly in "expression." With the key-board perfectly manipulated by the autophone, it will be seen that any one can at once be a practical musician, producing music of quality corresponding with the cultivation of their musical taste, and not depending upon any expert practicer. The mechanism of the autophone is connected with the ordinary pedals of the organ, and requires no skill for its operation. By use of the first key at the left of the receptacle for the sheet a hold may be made on any note or a rest, at the pleasure of the performer, and by means of the same key in connection with the white button any strain can be instantly withdrawn for repetition. These features particularly adapt the auto-



THE NATIONAL STEAM PUMP—DESCRIPTION, PAGE 149.

STAINS of nitrate of silver (lunar caustic) can be safely removed from linen by touching the moistened spots with tincture of iodine till they turn yellow, and then treating them with sulphate of soda or strong ammonia.

phone to accompaniments for singing, giving the singer full control of his instrument.

The autophone addresses itself not only to the interests of those unskilled in practice but who wish good music, but also to musicians themselves. Any artist will readily see that if he could have his key-board manipulated for him perfectly, and he had only to control the expression of his instrument, he could attain to heights of excellence never before within his reach. With a sufficient number of stops he can readily imitate a whole orchestra, bringing in any instrument, for even a single note or part of a note, to produce the most brilliant effects.

It is the intention of the inventor to place the autophone on the market in connection with the best make of cabinet and pipe organs, and also as a movable and portable attachment for organs and pianos already in use. The invention as well adapted to pianos as organs, giving automatically all the variety of touch possible to the fingers of any performer.

The expression keys, which in the organ control the stops, control the touch and soft and loud pedals of the piano, so that the same variety may be attained by a person wishing to exercise his own taste instead of the expression represented in the music-sheet.

The sheets will be prepared according to the expression of the best masters, and will be sold at the price of ordinary printed music.

Our space forbids the discussion of this invention in several aspects which present themselves. We must refer the reader for further information to Prof. Gally himself, whose office is at No. 9 Spruce Street, New York.

The National Steam Pump.

THE use of steam pumps in almost every branch of manufacturing, for mining and other purposes, has become so general, that this manufacture is at the present time a very important item of our national industries. As the demand has increased largely from year to year, more attention has been given to improvement in every particular. Great efficiency, with marked simplicity, are distinguishing characteristics of some of the latest styles of steam pumps.

The National Steam Pump, which we illustrate in this issue, is one of the leading competitors for public favor. It possesses special features of merit that are worthy of the careful attention of all persons in any way interested in this subject. It has received the endorsement of many practical men, and it was awarded the highest medal and diploma at the Centennial Exposition, the silver medal and diploma at the American Institute Fair, 1876, as well as other similar testimonials of merit.

It is of the direct-acting kind, the steam-cylinder working the pump by the same rod. The steam and pump cylinders are connected together by three brace rods, which keep the strain that exists between the two cylinders in a direct and central line. This plan is preferable to that of connecting the steam and pump cylinders by a bed-plate, on account of the springing of the latter from the unequal strain thrown thereon, which binds more or less all the working parts in proportion as the strain increases.

The steam and water pistons have packing rings, actuated by the pressure within their respective cylinders. The valve gear consists of an auxiliary motor which operates the valve of the main engine when it is in an inoperative state—that is, when the main engine is at the point of reversing.

This valve gear consists of the usual number of elements—namely, an auxiliary steam-cylinder with its piston and valve. The elements are, however, simplified by being embodied in some of the parts performing other functions.

The main steam-valve is the well known piston-valve, performing with its opposite ends or faces the function of the auxiliary piston. The main valve-chest performs the function of auxiliary valve in combination with the main valve-chest, which also performs the office of an auxiliary cylinder. The main valve-stem, when the engine is running fast, carries the valve to its proper position, being secured to the valve by a swell or auxiliary tappet, confined in the centre of the bore of the main valve by two heavy steel springs, secured at each end of the valve between a counter bore and a collar screwed to a shoulder, there being a certain amount of play or lost motion between the swell and springs, in order that the stem may be moved for the admission and expulsion of steam into and from the auxiliary cylinders without moving the main valve or auxiliary piston.

The auxiliary valve has four slots cut in the stem and combined with passages in the valve chest-bonnets, communicating with auxiliary cylinder and main valve-chest. The valve is so arranged that the main engine, through the medium of the tappet-lever on the main piston-rod, closes the main valve and auxiliary piston; but before the valve is entirely closed, the auxiliary valve or slots in the valve stem, combined with the ports in the valve chest-bonnets, admit or emit steam on the respective opposite sides, closing the main valve entirely and also opening the same on the opposite side; thereby admitting and emitting steam into and from the main cylinder for a return stroke.

The movement of the main valve and auxiliary piston from end to end of the valve-chest is checked

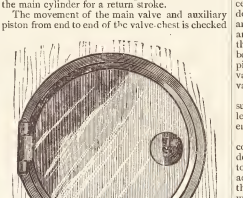


FIG. 1.—MILK RECEIVER—EXTERIOR.

by the same springs that secure the valve-stem to the main valve. The valve and auxiliary pistons are driven to and fro by two combined actions, being started by the main engine and afterwards assisted by the auxiliary steam motor before mentioned, and still further aided by a spring which is kept compressed by the steam during the stroke of the main engine until the valve is started for the return stroke, when the spring is released, the valve being locked in position by the pressure of the steam until ready for the return stroke. The advantages of

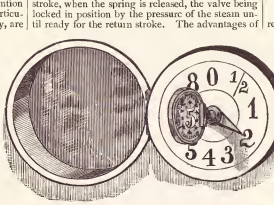


FIG. 2.—INSIDE VIEW.

this arrangement are evident. In most valve gears the blow of the valve against the chest-heads is checked by cushioning on steam in various ways; some by closing the exhaust ports before the valve reaches its destination, others by admitting steam, while still others have steam or air cushions attached to the valve gear; all of which have their defects, the greatest being that the water entering these cushions chokes up those parts and renders them

FIG. 3.—FUNNEL AND KEY.

inoperative just when the pump is most needed. Engineers are well aware that when a pump is started, or is running very slowly, the pipe is filled with the water of condensation, and the greater the length of the pipe the greater the condensation. It is claimed that this pump will run as well with water as with steam; consequently, if the pipe is full of water, the effect would be that of a hydraulic engine, and this pump may be used to raise water above the source of supply in order to operate other machinery. In the construction of a good pump there should be as few angles as possible for the water to pass in entering and leaving the cylinder, as every angle adds to the labor of the motive power. Of this pump it may be said, with one exception, that the water lies at the door of the cylinder chamber, for the suction and the delivery valves are in the heads of the cylinders, each having an area proportioned to that of the cylinder, never less than one-quarter in the smallest pump made; there being al-o no space or clearance left between the piston and heads. The ports lead from the suction-valves to the pump-cylinder, and thence to delivery-valves.

The construction of the motive valve gear is such that the strokes of the pumps are of uniform length, there being hardly any perceptible difference whether the pump is running slow or fast.

The one exception above mentioned consists in connecting the suction-pipe at the top of the cylinder in lieu of connecting it directly with the bottom passage. This arrangement may have its disadvantages, but it is claimed that they are more than compensated for by the result obtained in the working of the pump; a siphon being formed which keeps the suction-valves continually immersed in water. The instant the piston moves the water enters the cylinder and follows the piston, the pump being always charged, and consequently drawing water without difficulty.

The valves are easily accessible; by removing a bonnet at each end of the cylinder access may be had to any of the valves, and they may be removed and replaced, with their seats. Every passage may be examined and access had thereto."

The various sizes of this pump are manufactured by William E. Kelly, at the National Iron Works, New Brunswick, New Jersey.

Donaldson's Milk Receiver.

We take pleasure in placing before our readers a really useful and simple device for domestic use, which, in the delivery and receipt of milk, as retailed from wagons in cities and towns, must result in very great convenience both to dealers and consumers.

To dealers it will save a great deal of time now wasted in waiting for tardy servants, and in retracing routes, or parts of routes, for the supply of those who will not be roused at an early hour, but whose custom it is desirable to retain. Its general adoption will enable the milkmen to reach their route by the shortest available road, and pass over it with the greatest economy of time possible, without the necessity of any signal by bell-ringing or shouting, and to finish their route at an hour early enough to accommodate every customer.

To consumers it will save the necessity of waiting for the milk wagon, the risk in placing vessels outside of dwellings from the depredations of cats and tramps, the annoyance of the milkman's morning call, and the discomfort of being aroused too early.

Fig. 1 is an exterior view and Fig. 2 an interior view of the device. Fig. 3 represents the funnel employed to transfer the milk to the consumer's pitcher or other receptacle.

The device consists in a small apparatus, two and a half inches in diameter, secured by a strong, safe lock and key (as a post-office box), to be inserted through a two-inch hole in an iron gate, door, glass window, or any other feasible place. It is manufactured of metal, extra nickel-plated, is an ornament to a door and can be arranged by any carpenter.

When opened on the inside, as shown in Fig. 2, the receiver presents a two-inch opening and an indicator, with figures from 0 to 8, denoting pints, attached to which is a coin or ticket holder. The coin or ticket, also quantity of milk required, can be regulated from the inside of the house without exposure. There is also a pitcher-holder, sold separate, if required, to hold different sized pitchers.

The funnel shown in Fig. 3 has the key to the receiver attached thereto by a chain. When the receiver is opened the nozzle of the funnel is passed through the opening, and the amount of milk demanded, as shown by the indicator, is poured through it.

The cost of the device is only two dollars and a half, inserted in wood, and it certainly merits universal approval.

By reference to advertisement in another column, it will be seen that State Rights are for sale.

Further particulars, samples, etc., may be obtained by addressing Mr. F. Donaldson, No. 2 Spruce Street, New York City.

Bessemer Steel.

ADDRESS BY MR. BESSEMER, BEFORE THE IRON AND STEEL INSTITUTE.

We abstract the following from an interesting address delivered by Mr. Bessemer before the Iron and Steel Institute, England, at a recent meeting of that society. The engravings represent specimens exhibited by the speaker in the course of his remarks.

Iron was the first object he sought to obtain before venturing to make steel by his process. The first sample now shown was a little bar of iron 3 in. square, which was bent cold, and which was considered not a bad sample of cold bending. The second sample to which he would call attention was a little gun, a small and modest production, but one that had its peculiarities. It was a gun made of malleable iron without weld or joint. That it was made of malleable iron he was desirous to ascertain without question, and, in March, he requested Mr. Riley to see it put in the lathe and a small sample turned off, and then to take the sample and analyze it.

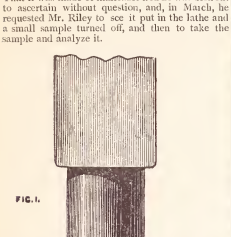


FIG. 1.

It was found that the metal of the gun contained 99.84 per cent. of pure iron; that was perhaps as near to pure iron as could be got. That gun was made in 1858—21 years ago. It was shown in that hall to the superintendent of the gun factories at Woolwich; and, upon the strength of it, certain cylinders were made of malleable iron and mild steel. He now exhibited a mild steel cylinder of 5 in. bore and 13/4 in. in thickness of metal, simply cast and crushed flat under the steam hammer while cold. He also produced a very interesting sample which he hoped would interest those present as a reminiscence of what had been done before. It would be remembered that the vessel first used by him for the converting process was a fixed upright cylinder. This form of converter had been adopted in Sweden, and into it they ran metal direct from the blast furnace; that metal was never made into pig, but was blown and made into ingots in nine minutes. One of those ingots was brought over to England, and was rolled into a circular saw plate of 5 ft. in diameter. This was the first Bessemer steel ingot ever rolled into a plate in this country; the ingot was unhammered,

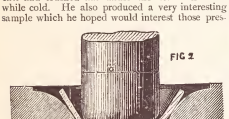


FIG. 2

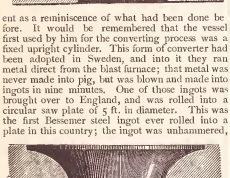


FIG. 3.

and was produced without the use of ferro-manganese, speigleisen, or recarburation. It was interesting to him, as the result of the first intimation of his process given to the world, through the British Association at Cheltenham. He had also a remarkable sample of the further practical working of this process very soon after the erection of his steel works at Sheffield, twenty years ago. Mr. Parkes, of Birmingham, had invented a system of producing copper tubes by pressing a round disc through a hole by a plunger, thus producing a kind of cup, which was subsequently extended by drawing in dies to a tube with a closed end. At his (Mr. Bessemer's) works at Sheffield, Mr. Parkes said he could do the same with steel as with copper, although he was obliged to use the best copper to do it. He (Mr. Bessemer) then thought differently, and said, "It is utterly impossible that so rigid a material as steel could be so treated." But Mr. Parkes was so serious and earnest that he (Mr. Bessemer) was induced to go the same evening

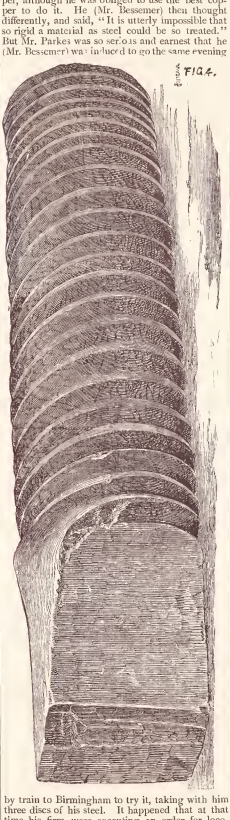


FIG. 4.

by train to Birmingham to try it, taking with him three discs of his steel. It happened that at that time his firm were executing an order for locomotive tube plates for the Lancashire and Yorkshire Railway, and one of the discs taken to Birmingham was a piece 27 inches in diameter and 1/2 inch thick, cut from the end of the plates intended for these tube-plates. At Mr. Parkes' works this disc was placed over a die with a trumpet-shaped mouth (Fig. 1) and subjected to the action of a plunger. When it had been forced into a cup shape Fig. 2) Mr. Parkes said they must anneal it, and this was accordingly done, and the steel cup allowed to get perfectly cold. When it was cold it was again put on the die, and a second thrust of the plunger forced it completely through, producing the vessel exhibited (Fig. 3) without the slightest injury being done to the metal. Thus the circumference of a plate 27 inches in diameter had been reduced to a circle of 11 inches. It was not done hot. If they had attempted to do so, the heat would have been abstracted unequally, and a flaw would inevitably have resulted. He did not know how such a thing could be done; he only knew that it was done before his sight; and he took that to be the best evidence of a fact very much disputed, viz., that twenty years ago a mild and tough quality of steel was produced. He had also a very interesting sample that was quite the work of their early days. The President had told them that they had rolled two rails from ingots at Dowlais. He had there the identical rail, or rather a portion of one of the identical rails, which were rolled under the superintendence of Mr. Williams, twenty-two years ago, and a more perfect rail they were not likely to get, so far as regards the power of rolling. But, in other respects, they had now got a very much better material, for this rail was found to be poor in carbon and rich in phosphorus.

Mr. Bessemer, in the course of his remarks, also exhibited a steel rail twisted cold throughout its entire length, of one end of which Fig. 5 is a representation. Another interesting sample was a 4 inch square bar, twisted hot. This is shown in Fig. 4. The address and the samples excited much interest and discussion. They show very conspicuously the capacities of this remarkable metal.

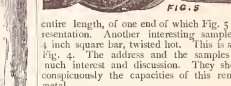


FIG. 5

The Inflexible Self-setting Cat Exterminator.—A Remarkable Invention.

It is the *New Orleans Times* which is entitled to the credit for bringing prominently into public notice the remarkable invention herein described. Topolil's Cat-Teaser must now take rank as one of the steps in the progress of civilization, relegated to a past age. In its day it was a great embarrassment to cats, but a greater than it has come.

The journal referred to says:

Last April letters patent were issued to one J. Tomlinson Hathaway, of Elizabeth, N. J., for the "Automatic, Inflexible, Self-Setting Exterminator"—a machine which was adapted to fill a want long felt in every family, and at the same time ruin the business of the chinaware and bootjack dealers. It is a combination of steel springs, barbed hooks, syringes, high-pressure air receivers and clockwork, constructed in the form of a diminutive cat, and covered with the skin of one of those mathematical but obnoxious animals. Underneath the supposititious belly is a clamp, so arranged that the "Inflexible" can be screwed on top of a fence and look as naturally as a living cat. When properly wound up it is fit to run for twenty-four hours. Every five minutes during the silent watches a portion of the compressed air is let out in a growl of challenge which will not fail to arouse the ire and attention of any cat within earshot. At the same time a small Rhumkorf coil within sends a current of electricity through small Gassiot tubes in the eyes, making them gleam with greenish and bellicose fire. This, together with the small size of the couchant Inflexible, is generally sufficient to draw the wandering felines of the neighborhood to the scene. Now, when one of them approaches sufficiently near to touch a small steel wire which projects from the Inflexible, the defiant yowl is repeated, and two small sprays of diluted vitriol are spit out at the cat—calculated to arouse the deepest indignation the turbulent breast of a cat is capable of. At the same time the counterfeit tail will swell up and wave to and fro aggressively. The natural result is a closing in of the now excited cat upon the Inflexible, touching a hair-trigger and releasing the machinery. The barbed claws now clutch the victim, the vitriol squirts, there is a wriggle, a yell and three yaups, and all is over. Then there is a faint click, the Inflexible's claws relax, the victim drops to the ground, and all is ready for another cat.

For the removal of boiler scale, principally composed of sulphate of lime, it is said that tribasic phosphate of soda is the best preparation. It absorbs the free carbonic acid in the water and acts upon the sulphate of lime, precipitating it as mud to the bottom of the boiler. In one case where this preparation was used the boiler was worked for five months without being cleaned, and only the very slightest deposit, which could be easily displaced by a touch, was formed.

The Rolling Mill of the Future.

Messrs. Dilworth, Porter & Co., whose rolling mill and spike works are at Pittsiburgh, have now, and have been for nearly two years (upon the authority of the *American Journal of Industry*, from which we extract the substance of the present article), using a continuous rolling mill or train that has drawn considerable attention among people interested in iron manufacture. It is a self-operating roll-train. The entire mechanism consists of a bed-plate, not bolted upon a foundation, as it is customary to do with the ordinary roll-trains, but resting upon stout legs that hold it ten or twelve inches above the floor. This bed-plate constitutes the seat or resting place of ten pairs of ordinary guide-roll housings, each having two eight-inch diameter chilled rolls, with but *one groove* in each pair, and these directly opposite or in line ; so that when the pile or billet (so far only 1¾ inch billet is used) is entered at the first pair of rolls, it next passes to the second pair, thence to the third pair, and so on through the entire ten pairs, and is delivered a finished bar or rod, of a size for the spike machine to cut into three or four sizes of spikes commonly used in broad-gauge, narrow gauge and coal mine railways. The first pair of rolls are driven at a speed of about ten revolutions per minute, while the tenth or last pair are driven at about two hundred and fifty revolutions per minute. The train is driven by belt, between which and the rolls are located a series of wheels so proportioned that each pair of rolls have imparted to them the speed required, from ten to two hundred and fifty, as stated. No catcher, rougher-down and catcher's assistant are employed to operate this train; one man can oversee all, from the time the billet enters, until caught by the boys who pass the finished rod to the spike machines.

The quantity produced by this train is daily (ten hours' work) thirty tons; and it will be apparent to any one who looks at it while in operation, that it has a capacity for fifty tons. At present it is required to produce only what is needed to keep the spike machines going, and to do this does not by any means demonstrate the capacity of the continuous mill. Indeed, the interval between the rolling of the bars is greater than the time occupied by the iron in passing through.

Mr. James H. Swett, a member of the firm of Dilworth, Porter & Co., and well known as the inventor of numerous useful inventions which have been long before the public, is the inventor of this continuous mill, which is expected, by those capable of judging, to be the method of the future. It is certain that of the many devices now and for some time before the public for doing away with hand rolling, none have gone so far toward practicability or succeeded so well in winning the approbation of practical men as this. It is the only continuous train yet devised in which horizontal rolls are alone employed that is a positive success.

Shoenberger & Co., of Pittsburgh, who are at present engaged in putting down an entire plant for steel production, have lately had finished a limited continuous train, which is to roll wire to No. 10 wire gauge. This, too, is made under Mr. Swett's patent, and was built by J. L. Lewis, of the same city.

Restoring the Apparently Drowned.

The season having arrived wherein most danger of accidental drowning exists, we have thought proper to publish the directions for restoring the apparently drowned, from the latest instructions issued by our Life Saving Service; they are those of Dr. Howard.

Where you can do so, send immediately for a regular medical practitioner.

RULE I.—*Arouse the Patient.*—Unless in danger of freezing, do not move the patient, but instantly expose the face to a current of fresh air, wipe dry the mouth and nostrils, rip the clothing so as to expose the chest and waist, and give two or three quick smarting slaps on the stomach and chest with the open hand. If the patient does not revive, proceed thus:

RULE II.—*To Draw off Water etc., from the Stomach and Chest.*—If the jaws are clenched, separate them, and keep the mouth open by placing between the teeth a cork or small bit of wood; turn the patient on the face, a large bundle of tightly rolled clothing being placed beneath the stomach, and press heavily over it for half a minute, or so long as fluids flow freely from the mouth.

RULE III.—*To Produce Breathing.*—Clear the mouth and throat of mucus by introducing into the throat the corner of a handkerchief wrapped closely around the forefinger; turn the patient on the back, the roll of clothing being so placed as to raise the pit of the stomach above the level of any other portion of the body. If there be another person present, let him with a piece of dry cloth hold the tip of the tongue out of one corner of the mouth (this prevents the tongue from pulling back and obstructing the windpipe), and with the other hand grasp both wrists, and keep the arms forcibly stretched back above the head, thereby increasing the prominence of the ribs, which tends to enlarge the chest. The two last-named positions are not, however, essential to success. Kneel beside or astride the patient's hips, and with the balls of the thumbs resting on either side of the pit of the stomach, let the fingers fall into the grooves between the short ribs, so as to afford the best grasp of the waist. Now, using your knees as a pivot, throw all your weight forward on your hands, and at the same time squeeze the waist between them, as if you wished to force everything in the chest upward out of the mouth; deepen the pressure while you can count slowly one, two, three; then suddenly let go with a final push, which springs you back on your first kneeling position. Remain erect on your knees while you can count one, two, three; then repeat the same motions as before, at a rate gradually increased from four or five to fifteen times in a minute, and continue thus this bellows movement, with the same regularity that is observable in the natural motions of breathing which you are imitating. If natural breathing be detected while you are at the bellows movement for three or four minutes, then, without interrupting the artificial respiration, turn the patient a second time on the stomach, as directed in Rule II, rolling the body in the opposite direction from that in which it was first turned, for the purpose of freeing the air passages from any remaining water. Continue the artificial respiration from one to four hours, or until the patient breathes; and for a while after the appearance of returning life, carefully aid the first short gasps until deepened into full breaths. Continue the drying and rubbing, which should have been unceasingly practiced from the beginning, taking care not to interfere with the means employed to produce breathing. Thus, the limbs of the patient should be rubbed, always in an upward direction towards the body, with firm grasping pressure and energy, using the bare hands, dry flannels or handkerchiefs, and continuing the friction under the blankets or dry clothing. The warmth of the body can also be promoted by the application of hot flannels to the stomach and arm-pits, bottles or bladders of hot water, heated bricks, stones, etc., to the limbs and soles of the feet.

RULE IV.—*After-Treatment.—Externally :* As soon as breathing is established, let the patient be stripped of all wet clothing, wrapped in blankets only, put to bed comfortably warm, but with a free circulation of fresh air, and left to perfect rest. *Internally :* Give a little brandy and hot water, or other stimulant at hand, every ten or fifteen minutes during the first hour, and as often thereafter as may seem expedient. *Later manifestations :* After reaction is fully established there is great danger of congestion of the lungs, and if perfect rest is not maintained for at least forty-eight hours, it sometimes occurs that the patient is seized with great difficulty of breathing, and death is liable to follow unless immediate relief is afforded. In such cases apply a large mustard plaster over the breast. If the patient gasps for breath before the mustard takes effect, assist the breathing by carefully repeating the artificial respiration.

The clenching of the jaws and semi-contraction of the fingers, which have hitherto been considered signs of death, are, in fact, evidences of remaining vitality, and should serve as a stimulant to vigorous and prolonged efforts to quicken vitality. Persons engaged in the task of resuscitation are, therefore, earnestly desired to take hope and encouragement for the life of the sufferer from the signs above referred to, and to continue their endeavors accordingly. In a number of cases Dr. Labordette restored to life persons whose jaws were so firmly clenched that, to aid respiration, their teeth had to be forced apart with iron instruments.

Refrigerating a 1,500 Ton Iron Ship—Can it be Done?

FOR some time past a project has been in contemplation by the Government at Washington, for constructing a refrigerating ship to be supplied with the requisite machinery for disinfecting purposes, and on the 9th ult. the board of naval engineers appointed by Secretary Thompson, at the request of the National Board of Health, entered upon their deliberations as to the method best adapted for the purpose. Fourteen plans, with specifications, were submitted by inventors, representing four different refrigerating agents, namely, anhydrous ammonia, liquid ammonia, vaporized ether and compressed air.

The object aimed at, is to determine the best agent and cheapest process of reducing the atmosphere in a 1,500 ton ship to zero, Fahrenheit, at New Orleans, in the month of July.

The whole amount appropriated for the construction of the ship and the refrigerating machinery is $200,000, and the specifications provide that the machinery, inner skin and other parts of the vessel shall be reduced to zero. Among the competitors there are several foreign inventors of high standing in this field of science. It is said that the great difficulties to be encountered make the scheme almost impracticable, if not impossible. With the thermometer outside say at eighty-eight, it would require great power in a machine to reduce the temperature of a 1,500 ton iron ship to zero.

Messrs. Neafie & Levy, the well-known engine-builders and ship-builders, construct most of the ice-making and refrigerating machines used in this country, using the Holden patent. Yesterday, Mr. Holden, in conversation with a *Bulletin* reporter, gave a number of interesting facts concerning the proposed refrigerating ship. He said that, with the vessel stationed in the Mississippi, with a July temperature, it would require an enormous machine to reduce the temperature of the vessel to zero. In comparing with others, Mr. Holden had been invited to offer plans for refrigerating the proposed vessel, which calls for reducing a space or atmosphere of one hundred and fifty thousand cubic feet to zero. To get an idea of the space thus to be cooled, it is only necessary to imagine an apartment 250 feet long by 40 feet wide and 15 feet high. The heat to be absorbed from the contained air in such a large apartment would be equal to the melting of 1,500 pounds of ice at zero to cool that air. To absorb the heat penetrating the vessel from the decks would be equal to the melting of over one thousand pounds of ice; while to absorb the heat from the sides, ends, etc., would equal the melting of 1,103 tons of ice to reduce the air to zero.

To reduce the interior of a 1,500 ton iron ship to zero and maintain that temperature would require the outer lining of the ship above the water line to be encrusted with ice or frost before it could be accomplished, while the warm water of the river below the water line would prevent such a measure. Of course it would be a different matter altogether, if the ship was lined with felt or other best non-conducting substances, or if the vessel was placed on land, and, in fact, it hardly seems practicable to refrigerate that iron ship.

It remains to be seen what the Board of Engineers will do in the matter. One thing, however, appears certain, and that is that the vessel and refrigerating machinery cannot be constructed for the sum of two hundred thousand dollars.—*Philadelphia Bulletin.*

A SOLUTION of common sodium sulphite will rapidly remove the stains of most of the aniline dyes from the hands.

CISTERNS containing the domestic water-supply should be occasionally run out and well scrubbed with a broom, and the sides and bottom well sluiced with a hot solution of potassium permanganate.

American Sumac.

THE *Chemical Review* records some experiments upon this material which will be useful to producers of the article. The object of the inquiry appears to have been to ascertain the main cause of the difference in the value of the American and Sicilian productions, and why the latter is so much preferred by tanners and dyers. Upon inquiry among the dealers, it appears by the employment of the American product the resulting work, in tanning especially, has a disagreeable yellow or dark color. Since the present analysis, and those published elsewhere, show a larger percentage of tannic acid in favor of the American product, it is evident that the difficulty must depend entirely upon a coloring matter, which, according to Loewe (*Freseuius' Zeitschrift für Analytische Chemie*, 1873, pp. 127, 128), consists of quercitrine and quercitine, which exists in larger quantity in the American than in the Sicilian. Endeavors were made to determine a ready and practical mode by which the separation of these coloring matters from the tannic acid in solution and their estimation might be effected; but from the fact that their deportment with re-agents is so similar to that of tannic acid, and their solubility in water appears to be so much modified by the presence of tannic acid, our endeavors to this end were unsuccessful. But while there may be no practicable method which may be applied to the separation of the coloring matter when in solution, we believe we have discovered how it may be entirely avoided. The manner in which this may be effected will appear later on. In the mean time, let us compare the percentages of tannic acid in the product, as indicated by our estimations in specimens collected at stated intervals during the season. Samples of

sumac were collected in the months of June, July and August, respectively. Of these samples, those collected in June and July were mixed varieties; and of the product collected in August we secured samples of the leaves of *Rhus glabra* and *Rhus copallina*, separately. For comparison with the Virginia material we obtained a sample of Sicilian sumac. In all of these samples the tannic acid was estimated by means of the method of Jean, published in the *Bulletin de la Société Chimique de Paris*.

The results obtained are indicated in the following table:

Variety.	Time of Collection.	Percentage of Tannic Acid.
Winchester, mixed	June	22.75
" "	July	27.38
" *Rhus glabra*	August	23.56
" *Rhus copallina*.	"	16.99
Sicilian *Rhus coriaria*.	"	24.27

It is evident, therefore, that in order to secure the maximum amount of tannic acid, the sumac should be collected in July. But, as before stated, the coloring matter of the leaves has an important influence upon the value of the product, and it appeared of value to determine when it was present in smaller quantity. At first it seemed reasonable to suppose that leaves from the young growth of wood, in which the coloring matter is not yet formed, as in the older wood, might be collected and found free from this troublesome substance, but examinations proved that this is not the case. It was therefore determined to make some experiments upon the color of precipitates with gelatine, made by means of solutions of the material collected in the different months, having the same strength in tannic acid for each.

In some of the tests, the precipitates obtained by means of the solution of the June collections, mixed sumacs were perfectly white and very much cleaner than any obtained from the Sicilian product. The difference in the color of the precipitates obtained from the solution of the June collection and that from solutions of the samples of later collections, was sufficiently marked to prove that the great difficulty in the way of the universal employment of the American to the exclusion of the expensive Sicilian product may be obviated by making our collections early in the season; that is, in the month of June. The percentage of tannic acid is not, it is true, quite as high as obtains in July, but it compares favorably with the Sicilian product.

BOOK NOTICES.

THE NEW CARPENTER'S AND BUILDER'S ASSISTANT AND WOOD-WORKER'S GUIDE. Revised and enlarged by Lucius D. Gould, Architect and Practical Builder. New York: Bicknell & Comstock, Architectural Designers and Publishers, 1879.

This book is one of the numerous publications designed to assist practical workmen, and it is much to be commended in having, to a much greater extent than is usual with books of its class, fulfilled its promise and purpose. Good, practical, concisely stated and easily comprehended rules, illustrated by diagrams, are given for finding sections of pieces placed in any position; for cutting every description of joints; for finding the form of the raking mould at any point divergent from the straight line; for springing and bending mouldings; for mitering circular mouldings, and planes oblique to the base at any angle. In addition to this, tables of the weight and strength of materials, and other matters of practical information, fill out the body of the treatise, including a useful glossary of technical terms.

CAMERON'S PLASTERER'S MANUAL. Containing accurate descriptions of all Tools and Materials used in Plastering; description of the Appearance and Action of every variety of Lime and Cement; Instructions for doing all kinds of Plain and Ornamental Plastering; Cistern Building; Form of Contract; Useful Tables; Many Important Recipes, etc. With Illustrations. By K. Cameron. New York: Bicknell & Comstock, Publishers, 1879.

A small but comprehensive treatise. May easily be carried in the pocket for ready reference. It is written by an experienced plasterer, and contains important information to all in the trade, as well as to dealers in plasterers' materials.

GRAPHICAL COMPUTING TABLE. By William H. Bixby, Lieutenant of Engineers, U. S. Navy. New York: John Wiley & Sons, 15 Astor Place, 1879.

This is a very ingenious and curious help, by which, without calculation and by inspection merely, anybody may multiply or divide any two numbers, find second, third or fifth power of any number, extract the second, third or fifth root of any number, obtain the circumference or area of any circle, obtain the volume of any sphere, or multiply or divide by the sine, cosine, tangent or co-tangent of any arc, reduce feet to metres or metres to feet, or compute percentages with an error of computation in all cases less than half of one per cent.

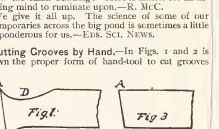
Handsomely printed on bristol board 18x19 inches, and accompanied by a small volume of text containing directions for use and valuable tables. Price, 75 cents.

Shop and House Hints.

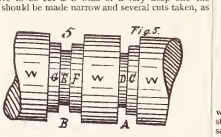
Smoky Chimney.—I find the following "cure" published in the *Illustrated Carpenter and Builder*, which hails from London: "Suspend a sheep's bladder down about four feet from the top of the chimney by a small wire attached to a stick across the top. This will last about twelve months, when a fresh bladder will be required. This I have found to answer in chimney-tops below the main building." The following queries suggest themselves: Why a bladder? Why a sheep's bladder? Why suspend the bladder? Why suspend it by a wire? Why suspend by a wire attached to a stick placed across the top of the chimney? Why suspend this part of the sheep's anatomy four feet from the top of the chimney? Should it be suspended inside or outside the chimney? Why does the charm fail at the end of twelve months? Why does the bladder prove most efficient in chimney-tops below the main building? Here is matter for an inquiring mind to ruminate upon.—R. MCC.

We give it all up. The science of some of our cotemporaries across the big pond is sometimes a little too ponderous for us.—EDS. SCI. NEWS.

Cutting Grooves by Hand.—In Figs. 1 and 2 is shown the proper form of hand-tool to cut grooves



in wrought-iron, etc., while Figs. 3 and 4 show a tool formed for soft metals, as brass, etc. If the groove to be cut is a wide or a very deep one the tool should be made narrow and several cuts taken, as



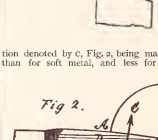
shown in Fig. 5, in which W represents a piece of work requiring grooves at A B; C D is a groove being cut at two cuts, while E, F, G, is being cut at three cuts. In each case one cut relieves the tool while it is taking the other one.

Tar for Roofs and Fences.—I have many years had the management of building for a gentleman of large landed and house property. He is very partial to tar, so I have been obliged to study the best plan I could find. We have used many of the patent dressings without satisfaction. We have used one pint of linseed oil to one gallon of coal tar. We now use, for new fence, one or two dressings of pine tar, and when dry mix a pint or more of air-slacked lime to one gallon of gas tar, and repeat it about once in three years. For light roof, for sheds, etc., we use light rafters, and cover with ½-in. deal; then one coat of pine tar; then a coat of coal tar, and cover with felt; another coat of coal tar, and when dry another coat of coal tar. Sow by hand, immediately on the last coat, as thick as you can get it to lay on even, a mixture of one part Portland cement, and two parts of river or sharp sand; repeat the tar and sand next year, then about once in three years. I have buildings wind and water tight, and look as good as new, which have stood near twenty years.—P. A.

Silvering Glass.—Melt in an iron ladle 4 oz. each of pure lead, pure tin and bismuth; stir these well together; then add 8 oz. of quicksilver, and thoroughly mix. The glass to be silvered should have a narrow strip of paper on the edge, and be made as warm as it can be held in the hand. A little of the hot metal is then poured on it, and the glass tilted every way, that the metal may run over and cover it. When the metal has set remove the pieces of paper, and brush the back over with paint.

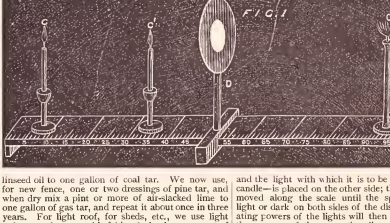
Side Tool.—A side or knife tool should be set so that it cuts at and near its point only, as at E in Fig. 1; the cutting edge being clear of the work at A. The angle of the top face D should vary in the direc-

tion denoted by C, Fig. 2, being made less for hard than for soft metal, and less for brass than for



wrought-iron or steel. Cutting it away as at B, instead of leaving it full, as shown by the dotted lines, saves grinding without weakening the tool.

Light Measuring.—Instruments for this purpose are called photometers. No one in use is better than Bunsen's for common use. We give a cut and description of this instrument which, in the present era of improvement in illumination, may be useful to some of our readers. A B represents a graduated scale, and P a disk of paper with a greased spot in the centre. This spot, when equally illuminated from both sides, looks equally light or dark on both sides. To test the illuminating power of a light—say a gas-burner—this light is placed on one side of the disk P,



and the light with which it is to be compared—say a candle—is placed on the other side; then the lights are moved along the scale until the spot looks equally light or dark on both sides of the disk. The illuminating powers of the lights will then be in the ratio of the squares of the respective distances of the lights from the disks. Thus, if the illuminating power of the candle be considered the unit, and it is found that when it is at two feet from the disk and the gas-burner is at four feet the spot is equally illuminated, the light of the gas will be to the light of the candle as four is to sixteen—that is to say, the gas-burner is of four-candle power.

Clarifying Water by Peach Kernels.—It is stated, on the authority of the *Monthly Journal of Pharmacy*, that peach kernels act powerfully in causing precipitation of matter suspended in water. A Dutch hotel-keeper in the Transvaal clarifies the turbid water of the district, it is stated, by throwing half a dozen dried peach kernels, slightly cracked, into a large butt of water. In an hour or two muddy water will be found to be quite clear. The truth of this may be easily ascertained by those interested. In commenting on the above, the *Chemical Review* says that the seeds of *Strychnos potatorum*, a poisonous shrub, are used in India for the same purpose. The water is poured into a rough earthenware vessel, and the seed is rubbed round and round against the side beneath the surface of the water. We are not aware that the chemical action of this process has ever been explained, but the natives are very reluctant to drink the water of a strange well without this precaution.

Test for Portland Cement.—Weigh a cubic foot of the dry cement. If good it should weigh from 80 to 100 pounds. The color of good Portland cement should be a warm bluish gray. The cement should be *quite* dry, free from all lumpiness or tendency to caking. When you take up a handful and squeeze it, it should have a soft, *silky* feel, and be free from grit. It should not cake in your band when squeezed.

List of Patents Granted June 3d, 10th, and 17th, 1879.

We will supply copies of any of the patents in this list, post-paid, to any address in the United States or Canada, on receipt of 50 cents per copy.

Patents Granted June 3d, 1879.

Air-compressor, C. Mo re.... 216,211
Alarm-lock, T. N. Roberts.... 216,219
Animal-power, J. F. McCre ry.... 216,205
Ankle-supporter, J. G. Pugsley.... 216,106
Axle-bearing, Car, H. W. F. rley.... 216,165
B le-tie, N. A. Haven.... 216,088
B ling-press, P. K. Dederick (reissue).... 8,737
Barber's chair, L. Marx.... 216,203
Bed-h ttom, Spring, D. B. Peck.... 216,057
Bed, Folding cot, H. W. Ladd, T. B. Raymond, and J. I. Spencer.... 216,194
Bed-spring, W. A. Bronson.... 216,142
Belt-fastener, O. H. Jones.... 216,092
Blankets, strap attachment for, H. B. Richmond.. 216,218
Blind-slat- laning machi e, C. P. S. Wardwell.... 216,070
Bone mill, G. Palmer.... 216,102
Bo t and Shoe, I. N. Mudgett.... 216,100
Boot and shoe heel stiffener, S. Prior.... 216,105
Boot and shoe heel stiffeners, mold for forming, W. C. Wise.... 216,122
Boring and reaming t ol, R. T. Crane.... 216,023
Boring bit, J. O. Martin.... 216,202
Bridle safety-bit, M. P. Shields.... 216,230
Broom-protector, adjustable, A. R. Norton.... 216,054
Brush, shoe, F. Zuenkeler.... 216,123
Bubble-blowing apparatus. D. Greenwalt.... 216,176
Buckle, G. D. Smith.... 216,114
Can-supp rti g case, G. H. Perkins and G. Brown (reissue).... 8,738
Car-Brake shoe, W. Conner and A. O. Denio.... 216,152
Car-spring, C. French.... 216,172
Carbureter, Gas, P. Keller.... 216,191
Card-holding device, M. F. Potter.... 216,058
Casting steel ingots, W. A. Sweet.... 216,117
Cellular press, F. G. Wisclogel.... 216,075
Chain-slide, neck, A. Op enheimer.... 216,101
Chair-stock, machine for finishing, L. B. Batcheller 216,015
Chandelier, Extension, G. Bohner.... 216,018
Churn, L. Sibert.... 216,111
Churn-dasher, J. E. and W. H. Gi bs.... 216,033
Cigar and cigarette-holder, R. C. Du Bois.... 216,160
Cigar-maker's table, C. Bucksbaum.... 216,149
Ci arette-machine, C. G. and W. H. Emery.... 216,164
Cock for steam-generators, try, J. Regester (re ssue.) 8,739
Coin-holding attachment, A. L. Thurston.... 216,068
Clasp, B. Greig.... 216,177
Clock-movements, lo k-work for, C. B. Owen.... 216,215
Cloth-cutting machine, A. Warth.... 216,245
Collar, horse, A. B. Harris.... 216,087
Col ar, steel hor e, E. Fisher.... 216,168
Colors, composition for applying, A. E. Méry.... 216,207
Colter, A. Aldrich.... 216,128
Combing and carding machines, mechanism for forming laps for, S. R. Parkh rst.... 216,103
Corset, G. H. Clarke.... 216,150
Cotton tie-fastener, J. D. Moore.... 216,096
Cuff-holder, C. F. Doring.... 216,158
Current-motor, W. W. Cleaveland.... 216,151
Cyli ders, cutter-heads, &c., device for balancing, C. Seymour.... 216,228
Dental plates, process and apparatus for the manufacture of, L. N., G. N., and L. N. Winderling. 216,250
Dental plugger, electric, E. L. Paine.... 216,055
Ditching-machine, C. D. Edwards.... 216,162
Doors open, device for holding, L. B. Leech.... 216,195
Dredging-scoop nozzle for min ng purposes, S. W. Shaw.... 216,061
Drinking-cup, collapsible, C. Sedg ick.... 216,227
Egg-beat r, G. Mooney.... 216,053
Elevator, C. W. Baldwin.... 216,013
Elevator safety device, R. M. Curtiss.... 216,024
Farm-gate, H. W. Goodwin.... 216,035
Feed-water to boilers, device for supplying, S. M. Fulton.... 216,173
Fence, Iron, K. D. Dodge.... 216,028
Fence-post, J. Hayne.... 216,037
Fence-post, K. McKinnon.... 216,052
Fire-arm, breech-loading, H. Bader.... 216,012
Fire-arm, breech-loading, F. W. Freund.... 216,084
Fire-arm, magazine, A. Burgess.... 216,080
Fishing apparatus, C. N. A. Voss.... 216,242
Flower, artificial, C. Schwenkel.... 216,223
Food, cattle, N. S. Lukey.... 216,199
Fork and device for making the same, W. Chisholm.... 216,021
Fruit or preserve jar, A. Gummer.... 216,036
Fuse, Blasting, G. Bloem.... 216,137
Gas for metallurgical and other purposes, apparatus for the production of, C. T. Du Motay and E. J. Jerzmanowski.... 216,118
Gas Generator, C. T. Du Motay and E J. Jerzmanowski.... 216,119
Gas-regulator, C. Hoffmann.... 216,186
Glass-mold, D. Barker.... 216,134
Governor, steam-engine, W. B. Carithers (reissue.... 8,735
Grain-binder, C. L. Travis.... 216,241
Grain scourer and cleaner, M. Toulmin.... 216,240
Grain-separator, J. W. Morrison.... 216,212
Grinding-tool, F. Mason.... 216,093
Grub-puller, J. C. Hodges.... 216,090
Hame-fastener, E. Covert.... 216,155
Harness-loop, W. E. Dippert.... 216,027
Harness-strap-cutting machine, H. L. Gordon.... 216,174
Harrow-teeth, rest and holder for pointing, C. P. Buckingham.... 216,019
Harvest-elevator, C. Ainsworth.... 216,126
Hatchway-door, W. H. Cooke.... 216,154
Hats and caps, former for straw and other, J. B. Mowry.... 216,213
Hay-elevator, J. C. Armstrong.... 216,130
Hay-fork, horse, H. W. Seavey.... 216,225
Hay-press, F. B. Boalt (reissue).... 8,733
Hay-rake, horse, S. T. Ferguson.... 216,166
Hay-rake, horse, D. P. Sharp.... 216,110
Hay-rake, revolving, J. H. McCormack.... 216,094
Hoe, N. W. Mills.... 216,210
Hoes, device for manufacturing, A. Schwehr.... 216,224
Hoop-shaving machine, A. J. Philpott and G. W. Horton.... 216,216
Horse-power, direct-acting, L. Herbert and W. V. Henry.... 216,089
Horse-rake, G. M. Titus.... 216,239
Horses from stalls, device for releasing, J. T. Condon.... 216,022
Horseshoe, J. Whiteford.... 216,248
Horshoe-calk attachment, W. Dickinson.... 216,026
Hydrocarbons, manufacture of porous blocks for effecting combustion of, G. H. Lilley.... 216,196
Ice-making machines, cut off for, S. B. Hunt.... 216,040
Insects by fumigation, device for destroying, R. B. Rathbun.... 216,060
Inspirator, W. R. Park (reissue.).... 8,734
Insulator, Telegraph, J. H. Bloomfield.... 216,138
Kiln for calcining limestone, plaster, &c., F. F. Tatro.... 216,066
Knitting-machine, W. Aiken.... 216,125
Knob attachment, door, D. and T. Morris.... 216,098
Lamp, W. S. Blaisdell and C. K. Young (reissue) 8,732
Lamp-extension device, D. Whiteford.... 216,072
Lubricator, N. Seibert (reissue).... 8,740
Mail-box, J. Sherriff.... 216,229
Mask, sanitary, P. H. Foster.... 216,171
Meat-carrier, J. E. Watkins and S. D. Bryant.... 216,246
Medicaments, Apparatus for capsuling, S. Limousin.... 216,197
Medicine-package, J. H. Guild.... 216,182
Middlings-purifier, H. White.... 216,121
Military accoutrements, J. E. Bloom.... 216,017
Millstones, shell for encasing, D. W. Marmon.... 216,048
Motion, converting, E. J. Frost.... 216,032
Mower, lawn, E. G. Passmore.... 216,056
Net for horses, fly, G. R. Ayres.... 216,133
Numbering-machine, J. Macdonough.... 216,046
Nut-lock, C. Schifferly.... 216,222
Ore-roasting furnace, D. W. Brunton.... 216,148
Oven-door and roaster, combined, H. G. Atkinson. 216,132
Oversleeve, A. P. Smith.... 216,115
Packing, piston-rod, S. Armstrong.... 216,131
Packing, piston-rod, J. Hewitt.... 216,038
Paddle-wheel, feathering, W. T. Merritt.... 216,208
Padlock, T. Slaight.... 216,062
Paper-box corner-piece, D. Steinberg.... 216,237
Paper collar, S. F. Hilton.... 216,039
Paper-cutting machine, G. R. Clarke (reissue).... 8,736
Paper for floors, oil-printed, T. S. Scott.... 216,109
Paper, manufacture of flexible, T. S. Scott.... 216,108
Paper-pocket, H. A. Fisher.... 216,169
Paper-pulp screen, J. S. Warren.... 216,243
Pen, pulsating stencil, J. H. Gunning and H. B. Weiland.... 216,086
Pencil and watch-key, combined, L W. Fairchild.. 216,031
Piano, K. V. Barnekov.... 216,135
Pill-machine, J. M. Richards.... 216,107
Planter, check-row corn, D. Unthank.... 216,120
Planter, corn, A. Aitken.... 216,127
Planter, corn, J. Kelly.... 216,041
Planter, corn, O. B. Seamans and J. H. Glezen.... 216,226
Planter, corn, G. Simonson.... 216,113
Planter, seed, G. W. Edwards.... 216,163
Plow, J. M. Matthews.... 216,050
Plow and cultivator coupling, W. P. Brown.... 216,145
Plow attachment, W. P. Brown.... 216,146
Plow-beams, machine for bending, W. J. Ball.... 216,077
Printer's rollers, receptacle for, J. Glastaeter.... 216,085
Printing machine, lithographic, J. Krayer.... 216,193
Propeller, hydraulic, B. B. Brewer and B. B. Ward.... 216,140
Propeller, Screw, J. Von Binzer and E. Bentzen.... 216,136
Propeller, screw, J. B. Ward.... 216,244
Propelling device for vessels, D. Gough.... 216,175
Pulley, W. Brown.... 216,079
Pulley, belt, P. Medart.... 216,095
Pump, air, H. Weindel.... 216,071
Razor-strop, J. H. Davis.... 216,157
Reel and drawer box, G. Simon.... 216,233
Refrigerator, W. H. and A. McCormick.... 216,204
Refrigerator building, W. Leland.... 216,043
Rocking-chair, J. S. Macard.... 216,200
Rolling-mill, W. H. and J. Whyte.... 216,073
Rope-coils, rack for holding, W. Scharnweber.... 216,221
Rope-fastening, W. B. Brooks and J. Braswell.... 216,143
Rotary engine, W. N. Fort.... 216,170
Rubber compound, hard, D. F. Connell and E. Fagan.... 216,153
Rubber, machine for grinding and doughing India, J. Heald.... 216,183
Saddle, harness, J. R. Young.... 216,251
Sample-box, C. E. Cochrane.... 216,081
Saw-handle, J. Holden.... 216,091
Saw-mills, lumber-gauge for, W. M. Dunn.... 216,161
Saw-setting machine, W. T. Smith.... 216,063
Scale and coin-tester, combined, G. Hoag.... 216,184
Scraper, corn and cotton, J. L. Pugh.... 216,059
Scraper, farm, street and road, J. Williams.... 216,074
Scraper, sulky, W. C. Marr.... 216,201
Seed-drills, drill-point for, J. A. Jones.... 216,189
Seeding-machine, B. Delong.... 216,025
Sewing-machine, H. Bland.... 216,016
Sewing-machine needle, J. P. Bridge.... 216,141
Sewing-machine tucker, C. F. Knoch.... 216,192
Sewing-machine, wax thread, E. E. Bean.... 216,078
Shaft-supporter, vehicle, J. W. Osburn.... 216,214
Sheep-protector, J. R. Speer.... 216,235
Sheet-metal can, J. S. Field.... 216,167
Shirt-protector, G. E. Wickens.... 216,249
Shoe, L. Rose.... 216 220
Shoe, laced, O. Durocher.... 216,029
Shoe-shank stiffeners, machine for cutting, O. Littlefield.... 216,044
Sink-trap, T. H. Sutton.... 216,238
Sink-trap and valve, A. S. Hodges.... 216,185
Skate, F. E. Dowler.... 216,159
Skate, water, W. C. Soule.... 216,234
Sleigh-knee, P. H. Cummins.... 216,156
Spinning-mules, momentum brake for, J. D. Stanwood.... 216,236
Spoke sawing and tenoning apparatus, S. G. Mason 216,049
Stall on shipboard, horse, J. Arless.... 216,129
Stamp-canceler, E. W. Brenner.... 216,139
Stamp, hand, J. F. Tenney and J. H. Reese.... 216,067
Stamping-mill, A. B. Lipsey.... 216,198
Staples, machine for inserting and clinching metallic, W. J. Brown, Jr.... 216,144
Steam-boiler and furnace, C. W. Reed (reissue).... 8,730
Steam-boiler-damper regulator, A. C. Harrison (reissue).... 8 731
Stone, restoring and preserving, C. O. Lundberg.. 216,045
Stove, heating, J. E. Gridley.... 216,178
Stove, open front, O. C. Mehurin.... 216,206
Stove-pipe thimble, H. B. Morrison.... 216,097
Stump and stone extractor, A. E. Cummings.... 216,082
Stump-extractor, R. Mortensen.... 216,099
Suspension rods, machine for forming eyes on, J. Streit and A. A. Burns.... 216,065
Telephone, mechanical, J. W. Maxwell.... 216,051
Thermostat, F. W. Mallett.... 216,047
Thill-coupling, G. H. Weed.... 216,247
Thrashers and separators, Straw-elevator for, A. W. Meyer.... 216,209
Tongs, pipe, H. Banister.... 216,014
Toy return-ball, T. Adams.... 216,124
Trace or tug, D. R. Porter.... 216,217
Type-writing machine, F. Sholes and W. F. Miller. 216,232
Valve, T. Pitt.... 216,104
Valve, oscillating, C. J. Elliott and H. B. McCool.. 216,030
Vehicle-brake, J. C. Zweidinger.... 216,076
Vehicle-spring, W. W. Grier.... 216,179
Vehicle-spring, W. W. Grier.... 216,180
Vehicle-spring, W. A. Sweet.... 216,116
Velocipede, B. A. Joule.... 216,190
Velocipede, J. Shire.... 216,231
Ventilation, R. B. Davy.... 216,083
Wagon-seat support, W. P. Brown.... 216,147
Wash-hoard, R. Grove.... 216,181
Washing-machine, R. Campbell.... 216,020
Water-conductor, T. W. Irwin and G. K. Reber.. 216,188
Weather-strip for doors, A. E. Gilman.... 216,034
Wells, clamp for polish-rods of oil, C. Sickels.... 216,112
Wells, &c., driving hollow metal piles for tube, A. Le Grand and R. Sutcliff.... 216,042
Wells, regulating theflow of oil, S. S. Spencer.... 216,064
Whiffletree, W. V. Wallace.... 216,069
Window-shade hanging, J. Hunkeler.... 216,187

Patents Granted June 10th, 1879.

Ammonia, manufacture of sulphate of, H. Grouven. 216.323
Animal-trap, W. McArthur.... 216,430
Animal-trap, F. W. Milby.... 216,287
Auger, earth, A. H. Botsford.... 216,372
Automatic ventilator, F. J. Crouch.... 216,313
Axle, vehicle, E. D. Ives.... 216,276
Bag-fastener, G. Ernst.... 216,385
Bags, &c., compound for preventing the destruction or rotting of, E. Osgood.... 216,290
Baling-press, F. J. Gardner.... 216,392
Baling-press, I. T. McIntyre.... 216,431
Balls out of leather scraps, &c., machine for making, S. Brown.... 216,305
Basket-splint, I. F. Wilcox (reissue).... 8,747
Bee-hive, J. Truax.... 216,475
Blacking-box, G. C. Furman.... 216,390
Blast-furnace tops, apparatus for opening and closing, J. Thomas (reissue).... 8,751
Boiler furnace, steam, C. D. Smith (reissue).... 8,750
Bolt-blanks, &c., machine for rounding iron for, O. W. Stow.... 216,469
Book-cover, C Eckhard.... 2·6,318
Book, &c., holder, E. R. Young and G. A. Goeller. 216,484
Boot, M. M. Clark.... 216,309
Boot and shoe, rubber, F. E. Hall.... 216,269
Boot and shoe sole, J. W. Clarson.... 216,380
Bottle-stopper fastener, W. P. Eayrs.... 216,261
Bottling-machine, J. J. Allison.... 216,367
Bread for baking, setting, R. Adam.... 216,300
Brush, blacking, E. N. Andrews.... 216,301
Brush-head, A. Shaffner.... 216,296
Brushes, vulcanized rubber face for metallic, E. A. Hill.... 216,408
Buggy-sulky attachment, A. H. Morse.... 216,436
Button, C. Brandt.... 216,255
Caboose for freight cars, C. L. Heywood.... 216,403
Cake-machine, J. W. and A. Ruger.... 216,461
Car-coupling, S. H. Lasswell.... 216,420
Car-coupling, J. G. Stigers, I. F. Bloom and T. J. Boyer.... 216,356
Car-doors, weather-strip for, J. L. Towne.... 216,473
Car-moving device, W. B. Newlon.... 216,441
Car-replacer, A. Rutherford.... 216,350
Car-starter, C. L. Heywood.... 216,407
Car-step, C. L. Heywood.... 216,405
Cars upon the track, device for replacing, C. L. Heywood.... 216,404
Carding-engines, &c., mechanism for feeding, W. C. Bramwell.... 216,373
Carpenter's combination-tool, T. E. Gifford and C. H. Alden.... 216,267
Carriage-top brace, C. F. Odell.... 216,343
Carriage-top, child's, L. Schmetzer.... 216,462
Chain-link, E. W. Skinner.... 216,355
Churn, J. L. Sprague.... 216,466
Churn-dasher, M. Ray.... 216,456
Cider-mill, R. C. Darrow.... 216,314
Clothes-mangle, J. S. Fox.... 216,320
Coin-blanks, machine for reducing, F. X. Cicott.... 216,308
Collar, horse, S. D. Reynolds (reissue).... 8,746
Collodion, manufacturing solid, V. Tribouillet and L. A. De Besaucèle.... 216,474
Compressing apparatus, F. J. Wehner.... 216,364
Corn separator, Indian, T. R. Taylor.... 216,472
Cornice truss, window, J. W. Campbell.... 216,376
Cradle, V. A. Menuez.... 216,432
Cuff-holder, C. F. Doring.... 216,383
Cultivator, H. S. Mead.... 216,283
Cultivator, G. W. Peterson.... 216,449
Dental engine, W. H. Gates.... 216,321

Desk, school, O. D. Case	216,307
Door-sheave, sliding, A. G. Safford	216,351
Drawing apparatus, perspective, G. Rosquist	216,460
Drilling machine, C. W. Coe	216,381
Drilling machine, metal, E. W. Fawcett	216,264
Egg-carrier, G. M. Huston	216,413
Elastic fabric, W. E. Jefferson	216,328
End-gate, wagon, A. M. Smith	216,464
Extension-table, J. Stephens	216,467
Feathers for dusters, machine for preparing, G. M. Richmond	216,366
Feed-water heater, S. G. Munn	216,439
Fence, W. H. Seat	216,353
Fence and gate, chain, S. June	216,417
Fence, barbed-wire, N. G. Ross	216,294
Fence-post, E. L. Case	216,378
Fence-wire, barbed, F. Swan	216,358
Fermenting vat, F. Littmann	216,335
Fertilizer-distributor, T. J. Carter	216,377
Finger-rings, adjusting attachment for, C. H. Wells.	216,492
Fire-kindling blocks, machine for dipping and coating, R. B. Whitzel	216,480
Flower-pots, manufacture of, E. A. Couch	216,311
Garment pattern, J. H. Brooke	216,257
Gas-fixtures, brake for extensible, J. McHenry	216,282
Gate, O. F. Fuller	216,388
Gate, H. Petry	216,447
Glove, Swimming, P. Primbs	216,455
Grain, nuts, &c., machine for cleaning, J. Johnson (reissue)	8,749
Gun-lock, C. E. Best	216,370
Gun, machine, W. Gardner	216,266
Hame attachment, J. Hudson (reissue)	8,748
Harness box-loop, J. C. Brightman and J. B. Burrell	216,256
Harrow, A. F. French	216,387
Harrow, spring-tooth, A. S. Baker	216.302
Harvester-reel, J. F. Appleby	216,253
Hat-brims, curling, R. Eickemeyer	216,319
Hats, stiffening, A. Solmans	216,488
Hay, straw and fodder cutter, G. T. Murray, H. and S. M. Willson	216,485
Hinge, W. H. Hart	216,399
Hog-holder, J. R. Wilson and W. M. Baker	216,482
Hog ring and ringing implement, A. St. Mary	216,468
Hoisting-machine, endless-chain, T. A. Weston	216,298
Hose-support, E. S. and S. M. Hinks	216,409
Hot-bed sash-ventilator, E. C. Seamen	216,487
Hydraulic elevator, H. Snowden	216,465
Hydraulic lift, W. B. Hyde	216,326
Hydrocarbon-furnace, R. S. Robertson	216,459
Hydrometer, H. Blattner and F. Adam	216,304
Ice implement, D. N. B. Coffin	216,310
Insect exterminator, J. Z. Walker	216,476
Ironing-board, bosom, C. W. Hilton	216,274
Ironing-stand, H. B. Summers	216,297
Journal bearing, car-axle, G. R. Meneely	216,285
Knitted hood, F. W. Henson	216,402
Knob, door, G. Jones (reissue)	8,743
Ladle for pouring metals, F. Shickle	216,354
Last, G. M. Wells	216,491
Latch, J. W. Day	216,316
Lock, J. J. Dinnan	216,260
Locomotive-engine, W. B. Hosford	216,275
Lubricator, D. P. Baldwin	216,303
Magnetic separator, H. E. Cook and J. B. Thayer.	216,258
Measuring and saving liquids, apparatus for, C. Pfanne	216,450
Mechanical movement, S. Y. Love	216,425
Medical compound, B. G. Durette	216,317
Medical compound, C. Heaton	216,401
Medicine, veterinary, N. and A. Rosenthal	216,348
Metallic can, G. H. and J. H. Perkins (reissue)	8,744
Meteorological instrument, A. J. Myer	216,440
Middlings-separator, C. F. Keller	216,333
Mining-flume, portable, J. Howe and N. Waite	216,325
Musical instrument attachment, M. J. Matthews and J. P. Richardson	216,429
Napkin-holder, L. S. Weed	216,478
Neck-tie, W. A. Laverty	216,421
Newspaper-folding machine, C. Kahler	216,332
Nut and collar, sectional, E. M. Morgan	216,338
Nut-lock, L. Spain	216,489
Offal, treating, W. Adamson (reissue)	8,741
Offal, treating, W. Adamson (reissue)	8,742
Oiling-vessel, E. T. Jones	216,416
Overcoat, W. Sweatman	216,359
Packing, steam G. C. Phillips	216,451
Paper-box machine, F. H. Strieby and J. C. Rankin	216,357
Pessary, voltaic, J. J. Looney	216,281
Photographic background, L. Moberly	216,435
Piano-forte music rack, G. W. Lyon	216,428
Picture-frame back-brace, J. Ried	216,347
Planter, corn, C. G. Everet	216,386
Planter, corn, J. Selby	216,295
Planter, corn, T. F. Tanner	216,471
Planter, hand seed, R. R. Lewis	216,423
Plow, W. H. Harrington and A. B. Merrill	216,271
Plow attachment, sulky, M. Brown	216 375
Plow, hill-side, G. W. Peterson	216,448
Plow, sulky, T. E. Jefferson	216,415
Plow, sulky, E. W. Newton	216,442
Plow, swivel, J. Nourse and J. A. Howe	216,443
Plumber's trap, J. K. Miller	216,288
Potash from ashes, separating, J. and R. H. Woodrum	2,6,483
Preserving compound, H. Jannasch	216,414
Printing machine, plate, A. Hamilton	216,397
Printing machine, plate, E. Hewitt	216,273
Propelling apparatus, vessel, A. E. Tangen	216,470
Pump, C. E. Drake	216 384
Pump bucket, chain, J. F. Secord	216,463
Pump, oscillating, D. Palacios	216,444
Radiator, steam, W. M. Fuller	216,389
Radiator, steam, T. P. Hardy	216,400
Radiator, steam, C. Hart	216,324
Rag-engine, W. H. Russell	216,349
Railway-frog, P. Haley	216,268
Railway signal-light, C. L. Heywood	216,406
Railway-switches, device for operating, H. Greenway	216,395
Rein-holder for vehicles, L. Grape	216,394
Rock and coal drilling machine, T. E. Morpeth	216,437
Rope-reel, A. C. Mason	216,485
Rotary engine, A. Lesperance	216,280
Rotary engine, A. Noteman	216,342
Ruching for decorating rooms, G. W. Kingsley	216,278
Saddle, harness, A. Gilliam	216,393
Saddle pad, harness, J. F. Knorr	216,419
Safety-pin, P. Miles	216,337
Saw, drag, W. S. Brewer	216.374
Scaffold, A. Metz	216,433
Scaffold, G. W. Potter	216,292
Screw, Jack, S. C. Megill	216,284
Seal-lock, N. W. Palmer	216,445
Sewing-machine, T. W. Morrison	216,289
Sewing-mcahine, T. W. Morrison	216,339
Sewing-machine button-hole attachment, A. M. Leslie	216,422
Sewing-machine trimming attachment, C. M. R. Glanville	216,322
Sheet-metal can-bodies, machine for making, H. Miller	216,434
Shingle-sawing machine, B. F. Penney	216,344
Shoe shanks, machine for forming metallic, H. H. Jenkins	216,330
Shoe-shanks, machine for shaping metallic, H. H. Jenkins	216,329
Shoe-upper, J. Brown	216,306
Show-case, O. H. Blood	216,371
Smoke-stack and spark-arrester, locomotive, W. M. K. Thornton	216,362
Smoke-stack and spark-arrester, locomotive, W. M. K. Thornton	216,363
Smut and brush machine for cleaning grain, J. M. Galt	216,391
Snow-plow, E. W. Harrison	216,272
Soles to uppers, machine to unite, A. J. Wilbur	216,299
Spider, J. M. Reed	216,346
Spinning-ring, H. L. Pierce	216,345
Spool-blanks, machine for making, J. M. Johnson and C. E. Burns	216,331
Spring and dead bolt, combined, W. A. Nettleton.	216,341
Stamp type, holder for hand, J. Murdock, Jr	216,340
Steam-boiler covering, T. Merriam (reissue)	8,745
Steam-boiler covering, J. C. Reed (reissue)	8,752
Steam for heating, &c., apparatus for supplying, T. Miller	216,286
Steam or water motor, R. H. Atwell	216,369
Stone, device far handling and setting, E. J. Leyburn	216,334
Stove and range top centre-piece, W. Morand	216,438
Stove-doors, mica-holder for, M. P. Low	216,426
Stove-fender, H. Terstegge, R. H. and F. H. Gohmann	216,361
Suspenders, H. Andres	216,368
Syringe, J. H. Guest	216,396
Tapping mains, device for, J. H. Chapman and R. Hawthorn	216,379
Telegraph, printing, J. A. Hitter, Jr	216,411
Thill-coupling, A. Hard	216,270
Thill-coupling, M. H. Risser	216,458
Thill-coupling jack, E. Eberly	216,262
Thill-coupling loop, H. K. Porter	216,291
Thill-support, vehicle, G. H. Pitcher and L. Young.	216,453
Thimble, E. F. McCartney	216,336
Tidy-holder, H. Wellington	216,365
Tilting-gate, R. L. Dawson	216,315
Tire-bending machine, J. F. Bender	216,254
Tobacco, apparatus for steaming leaf, A. Robinson.	216,293
Tobacco-making-machine, plug, W. A. Ford	216,265
Tombstone from potter's clay, W. P. and W. D. Loyd	216,427
Tongs, seaming, G. Peacock	216,446
Torch, fire-kindling, J. P. Welshans	216,479
Track-clearer, steam, A. Kindermann and C. Reiblein	216,418
Tubing upon shafts or spindles, machine for placing elastic, R. B. Ewing	216,263
Tug-coupling, P. B, Hirsch	216,410
Umbrella, Z. Walsh	216,490
Valve, rotary, W. Redmond	216,457
Vehicle-spring, J. H. Sanderson	216,352
Vehicle-wheel, L. B. Lawrence	216,279
Ventilating buildings, air heating and cooling apparatus for, W. P. Pickhardt	216,452
Ventilation for mills, &c., V. P. Harris	216,398
Vessels, ballast-log for, C. Liparelli	216,424
Wagon-brake, automatic, W. A. Yeatts	216,493
Wagon, dumping, L. Jarman	216,327
Wardrobe-hook, L. F. Ward	216,477
Water-closet, H. H. Craigie	216,312
Water-metre, rotary, E. C. Terry	216,360
Water-wheel, A. B. Couch	216,382
Weather-board gauge, J. Allison	216,252
Well rig, oil, G. Corbett	216,259
Wharf, S. Howell	216,412
Whiffletree centre-plate, H. K. Porter	216,454
Windmill, F. M. Wilson	216,481
Wood-working machine, E. and J. Jackson	216,277

Patents Granted June 17th, 1879.

Air engine, compressed, W. R. Eckart	216,563
Air engine, compressed, R. Hardie and J. James	216,611
Amalgamator and concentrator, G. R. Evans	216,564
Ax-pocket, A. Crosby	216,605
Axle-box, car, D. A. Hopkins	216,517
Axle-skein, vehicle, N. L. Holmes	216,615
Axles, spring-washer for vehicle, D. Dalzell	216,512
Bag-fastener, W. Terrell	216,583
Baling-press, H. Parker	216,694
Ball-trap, B. F. Wright	216,590
Bed-spring, A. Underwood	216,634
Beer, swimmer for cooling, L. D. Biersach	216,550
Belts, friction compound for, F. Brown	216,596
Bird-cage food-holder, F. C. Bowen	226,651
Boot and shoe, P. Cox	216,660
Boot-strap, H. M. Weaver	216,544
Bottle-stopper, C. G. Hutchinson (reissue)	8,755
Bridle-bit, G. P. Butler	216,653
Broom and brush head, G. Iveson	216,570
Buckle, hame, W. C. Huston	216,520
Bung-bush, J. Lacey and G. B. Cornell (reissue)	8.759
Burial-casket, L. W. Drake	216,513
Butter-stamp, W. Hart	216,674
Butter-worker cooler, H. C. Warner.	216,635
Button, F. W. Richards	216,701
Can-case, G. W. Banker	216,497
Car-brake, J. Bachmann	216,495
Car, oil, M. C. Brown	216,506
Car-starter, J. W. Moore and J. A. Svedberg	216,525
Carriage-brake, child's, W. L. Weston and W. C. Maynard	216,546
Carriage-curtain fastening, F. Baumgartner	216,499
Cartridge capping and uncapping implement, F. A. Canfield	216,554
Cartridge-holder, O. R. Luther	216,620
Cartridge, pyrotechnic-signal, A. H. Bogardus	216,552
Chain, leather, C. F. Rumpp	216,533
Chain-link, C. A. Chamberlin (reissue)	8,761
Change-box, A. Bradford	216,647
Churn, D. Schweikhard	216,578
Churn-dasher, A. H. Bell	216,643
Churn-power, F. Faubel	216,665
Clothes-bar, J. P. Mallette	216,621
Clothes-drier, B. Knopp	216,683
Clothes-line, &c., fastener, J. Bohlen	216,646
Clothes-pounder. L. Coplin	216,604
Copy-holder, C. S. Caldwell	216,654
Cornet, D. J. Blaikley	216,595
Corset, L. M. and M. D. Chipley	216,555
Curtain fixture, balance, J. M. Osgood	216,692
Dental plugger, R. B. Donaldson (reissue)	8,763
Desk, school, C. F. Hill	216,676
Ditching machine, E. D. Loops and J. Braddock	216,709
Door-bolt, J R. Payson	216,695
Door-fastener, S. L. Chase	216,602
Door, grain, T. Sills	216,580
Door-sheaves, sliding, M. Roberts	216,702
Door-spring and check, combined, R. C. Love	216,688
Drawing-board, G. W. Da Cunha,	216,662
Dredging-tube, pneumatic, W. P. Lewis	216,686
Dumb-waiter, W. F. Holske	216,568
Dummy Figure, J. A. Gillotte	216,610
Dust-pan, S. M. Perry	216,529
Ear-holder, F. C. Batcheller	216,498
Elevators, belt safety attachment for, C. L. Page	216,528
Evaporating-pan, A. Brear	216,649
Extracts and distilling liquids, apparatus for making, M. Cziner	216,557
Fastening strip or clasp, J. H. Weaver	216,543
Faucet, A. Moore	216,627
Faucet, measuring, D. A. Hauck	216,675
Faucet, water, H. H. Craigie	216,661
Faucets, automatic weighing attachment for, K. D. Hawley and G. W. Anderson	216,567
Fence, barbed wire, E. V. Wilkes	216,667
Fence-barbs, machine for making, R. A. Belden	216,594
Fence, wire, B. Wilson and F. P. Grimes (reissue)	8,757
Fertilizer-distributor, W. Hodges	216,678
Fifth-wheel, vehicle, J. A. Bilz	216,551
File-holder, C. E. Cochrane	216,657
Fire-alarm, F. N. Roberts.	216,576
Fire-escape ladder, D. Hays and W. Free (reissue)	8,758
Fruit-jar, J. H. Stamp	216,707
Fuel, manufacture of artificial, O. Hassel	216,613
Funnel, measuring, J. Pfitzenmeier	216,530
Furnace and stove, J. C. Stuart	216,539
Gas-burners, apparatus for automatically regulating the flame of, I. and A. Herzberg (reissue)	8,754
Gas, process and apparatus for manufacturing illuminating, R. M. Hunter	216,519
Gas, process and apparatus for the manufacture of, G. W. Harris and A. L. Allen	216,612
Gas regulator, W. Cowan	216,556
Governor, pumping engine, E. L. Otis	216,693
Grain-binder, A. Ross and S. J. Parker	216,532
Grain, bobbin of wire for binding, R. C. Fay	216,666
Grain-crushing machines, porcelain roll for, W. Braun	216,553
Grain-drill, E. M. Morgan	216,572
Grate-bar, F. Steele.	216,708
Grave-guard and tomb-stone, M. Beckler	216,500
Harness-coupling, F. Reynolds and G. D. Hayes	216,700
Harness for preventing horses from kicking, W. Smith	216,705
Harvester reel and dropper, A. C. and R. W. Sriver	216,706
Hay and cotton press, E. Beedle.	216,642
Hay elevator and carrier, W. L. Kinsey	216.521
Heel-breasting machine, E. May	216,623
Heliotrope, J. W. Garner	216,565
Hose-jacket, fire, C. B. Allaire	216,639
Hub-attaching device, O. C. Mason	216,524
Husking-pin, W. E. Hall	216,672
Hydrocarbon-vapor burner for heating purposes, H. H. Eames	216,562
Ice-cream-freezer dasher, J. H. Dunbar	216,607
Ink for printing protective tints on commercial blanks, E. Mendel	216,625
Insect-destroyer, G. H. Hull	216,679
Insect-destroying machine, W. M. Hicks	216,614
Invalid rocking-chair, C. Sundquist	216,582
Ironing and seam-opening machine, J. T. Bruen	216,507
Irrigation-pipe, E. M. Hamilton	216,673
Jewelry, plated, A. Vester	216,586
Knitting-frame take-up, W. H. Carr	216,655
Lamp, C. F. Burnap and T. Cope	216,652
Lamp-burner, J. Trent	216,542
Lamp-burner cone, J. Trent	216,540
Lantern, J. Trent	216,541
Last, repairing, W. J. Crowley	216,509
Lasting machine, J. W. Hatch (reissue)	8,764
Lasting-machine, R. C. Lambart	216,685
Lathe-centre, adjustable, A. A. Robinson	216,703
Lemon-squeezer, C. J. Reynolds	216,699
Lock, L. Bensel	216,502
Loom shuttle motion, J. Burton	216,508
Lubricator, W. P. Phillips	216,531
Manures, machine for distributing, W. Shaw and D. Williamson	216,579
Match-box, E. B. Beecher	216,501
Meat-chopper, E. M. Silver	216,536
Meat in cans, apparatus for packing, T. Houlahan.	216,569
Meat, package for canned, T. Ashwell	216.494
Mechanical movement, D. Abrey	216,638
Middlings, flour, &c., feed-roll for, C. A. W. Jaquett.	216,617
Milk-cooler, C. L. and S. P. Bacheller	216,640
Millstone-driver, G. T. Smith and W. F. Cochrane.	216,704
Millstones, dressing, D. Brubaker	216,597
Mirrors, protecting the backs of, G. W. Walker	216,587
Miter-cutter, W. R. Fox	216,608
Monkey-wrench, W. M. Green	216,516
Motion at regular intervals, apparatus for producing forward-and-backward, I. and A. Herzberg (reissue)	8,753
Motion, device for converting reciprocating into rotary, J. Skinner	216,537
Motion, mechanism for converting reciprocating into rotary, I. N. Ellis and R. W. Rule.	216,560
Musical instrument, mechanical, M. J. Matthews	216,622
Nail picker and separating machine, M. A. Williams.	216,713
Oils and fats, bleaching, J. Davis	216,558
Oxide, process and apparatus for manufacturing carbonic, C. T. Du Motay and E. J. Jerzmanowski	216,584
Pail, lunch, J. J. Tillinghast	216,632
Paper-box, W. H. Tunis	216,711
Paper-folding machine, C. Chambers, Jr., and W. Mendham	216,598
Paper-folding machine, C. Chambers, Jr., and W. Mendham	216,599
Paper-folding machine, C. Chambers, Jr	216,600
Paper-folding machine, C. Chambers, Jr	216,601
Paper-making machines, felt-guide for, J. Peaslee	216,696
Paper-pulp, engine for preparing stock for making, C. Bremaker	216,505
Petroleum into a uniform, purified and deodorized oil, converting crude, H. F. Howell	216,518

Picture-exhibitor, P. Costa..... 216,659
Plane, H. B. Price..... 216,698
Plane-stock, flexible-faced, S. D. Sargent..... 216,577
Planter, cotton, T. M. Barnes..... 216,548
Platform or mat, H. L. Palmer..... 216,573
Plow, J. Austin..... 216,598
Plow, riding, G. E. Wolcott..... 216,744
Printer's galley, T. T. McNeil..... 216,685
Printing machine, plate, T. C. Kenworthy and G. W. Clark..... 216,681
Propellers, raising and lowering, J. W. Dilks..... 216,559
Pruning implement, A. J. Little..... 216,571
Pump, centrifugal, E. Chaquette..... 216,663
Punch, drill, shears, &c., combined, R. Bates and J. H. Wild..... 216,641
Punches, shears and stamps, mechanism for actuating, J. T. Bedford..... 216,593
Rag-washing machine for rag and paper washing engines, J. Tyler..... 216,585
Railway rails, securing fish plates to, E. Bourne (reissue)..... 8,761
Railway switch, H. A. Norton..... 216,691
Rice-hulling machine, E. Totman..... 216,633
Roof for sheltering grain, portable, J. R. Davis..... 216,646
Roofs and vessels and for other purposes, compound for covering, J. Wettenhoffer..... 216,547
Roofing-plates, machine for bending sheet metal, J. F. Carrier..... 216,544
Saw, drag, T. B. Fagan..... 216,665
Sawing machine, drag, W. W. Giles..... 216,668
Sawing machine, drag, W. W. Giles..... 216,669
Scales, weighing, W. C. Farnum..... 216,534
Scraper, wheeled, G. J. Weber..... 216,634
Seal lock, J. J. Tillinghast..... 216,631
Sewing machine, T. Green..... 216,671
Sewing machine, button-hole, J. J. Graff..... 216,670
Sewing machine, hand-motor, J. Bancroft..... 216,496
Sewing machine, straw braid, C. F. Bosworth..... 216,504
Sewing machines, elastic treadle for, J. W. A. Huss. 216,610
Shingle-cutting machine, J. H. Phipps..... 216,575
Shoe, A. Black..... 216,503
Shutter-worker, W. Jones (reissue)..... 8,756
Sifting machine, N. Bostedt..... 216,549
Skate, roller, J. M. Lewis..... 216,687
Smelting fine or dust ores, H. Eames..... 216,661
Sock-protector, F. Smith..... 216,588
Speed regulating mechanism for cotton-sliver evenders, J. R. Keilley..... 216,630
Stalk-cutter, J. Kraft..... 216,684
Steam and air brakes, operating valve for, G. Westinghouse, Jr..... 216,545
Steam engine, E. S. Wescott..... 216,636
Stool, camp and hunting, J. Powell..... 216,699
Stove, C. F. Hill..... 216,677
Stove and furnace, summer, C. Truesdale..... 216,721
Stove-board and table-mat, H. L. Palmer..... 216,574
Stove, cooking, J. F. Allen..... 216,591
Stove lining, J. Riplinger (reissue)..... 8,760
Surgical splint, J. E. Johnson..... 216,680
Swings, &c., device for suspending, M. C. Mayo and B. Noyes..... 216,604
Switch and signal, interlocking, A. G. Cummings.. 216,510
Toy, G. Muller..... 216,506
Toy, candy, R. H. Moses..... 216,608
Transportation box for fruit, &c., C. R. Sigwald... 216,535
Treenail for ships, &c., T. W. Kirby..... 216,683
Tubular boiler, P. S. Forbes..... 216,667
Tug-hook, hame, J. M. Johnson..... 216,618
Tug or hook, thill, J. A. Lazelle..... 216,619
Umbrella, W. B. Greene..... 216,766
Valve, balanced, J. D. Fairbanks..... 216,664
Valve, steam, P. W. Gordon..... 216,615
Vehicle spring, J. Miller..... 216,626
Ventilator, W. B. Brown..... 216,650
Vulcanizing rubber, &c., apparatus for, F. Z. Nedden..... 216,527
Wagon-jack, G. A. Bogart..... 216,645
Wagon, road, J. L. Phillips..... 216,617
Wagon running-gear, B. C. Shaw..... 216,534
Waiter, hotel and restaurant, L. Garrigan..... 216,609
Washing machine, D. F. Stambaugh..... 216,581
Wells, device for increasing the production of oil, B. & C. Collins..... 216,658
Whiffletree, N. W. Brewer..... 216,648
Whiffletree, J. A. Chase..... 216,656
Whip-socket, J. Lowth..... 216,525
Window-protector and ventilator, J. L. Walton..... 216,712
Wood-bending machine, F. W. C. Lange..... 216,522
Wood, preserving, W. Wellhouse and E. Hugen.. 216,589
Wooden-box machine, E. Benson..... 216,644
Wrench, R. Mikkelson..... 216,690

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